Inventory and Assessment of USDA/Soil and Water Conservation District Watershed Dams

Finding Report





Contract No. SWCC-4-C
Date of report: December 27, 2007

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Schnabel

Schnabel Engineering South, LLC

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EXECUTIVE SUMMARY

The Georgia State Soil and Water Conservation Commission (Commission), in partnership with the Natural Resource Conservation Service (NRCS) and the Georgia Environmental Protect Division (EPD), has begun to evaluate the flood control dams, designed and constructed under federal laws PL 544 and PL 566, to determine which structures can be modified to serve as water supply reservoirs.

In excess of 350 dams were constructed in the state of Georgia under the federal watershed program that started in 1957. These dams were principally designed and constructed to serve as sediment traps and to provide flood protection for agricultural interests in rural areas of the state. However, many of these dams are now in, or adjacent to, urban areas where flood control is even more relevant, but the demand for water is exceeding the supply. Most of the watershed dams in Georgia are maintained and operated by Soil and Water Conservation Districts. In a few instances, cities or counties are the easement holders and have the responsibility to operate and maintain the structures. The watershed districts operate under the guidelines of the GSWCC.

The GSWCC, with assistance from the NRCS and the EPD, performed an initial assessment of the 357 watershed dams. The initial assessment was based upon the structures' proximity to heavily developed urban areas and drainage basin or watershed area. If the watershed contributing runoff to the structure was less than 4 square miles (2560 acres), or the dam was located near a dense urban environment, the structure was eliminated as a viable candidate, based on low yield potential or the likelihood of not being able to readily acquire land for an increase in pool area. Based upon the above criteria, 191 structures were determined not to be viable candidates for water supply reservoir.

The GSWCC retained the professional services of the project team of Schnabel Engineering South, LLC (Schnabel), Jordon Jones and Goulding (JJG), Joe Tanner and Associates, and Tommy Craig to further evaluate the remaining 166 structures based upon environmental impacts, infrastructure impacts, and potential yield. Twenty dams that were identified as having a relatively high potential for yield, relatively moderate potential for environmental or infrastructure impacts, and located in areas in serious need of water, were selected for more detailed studies.

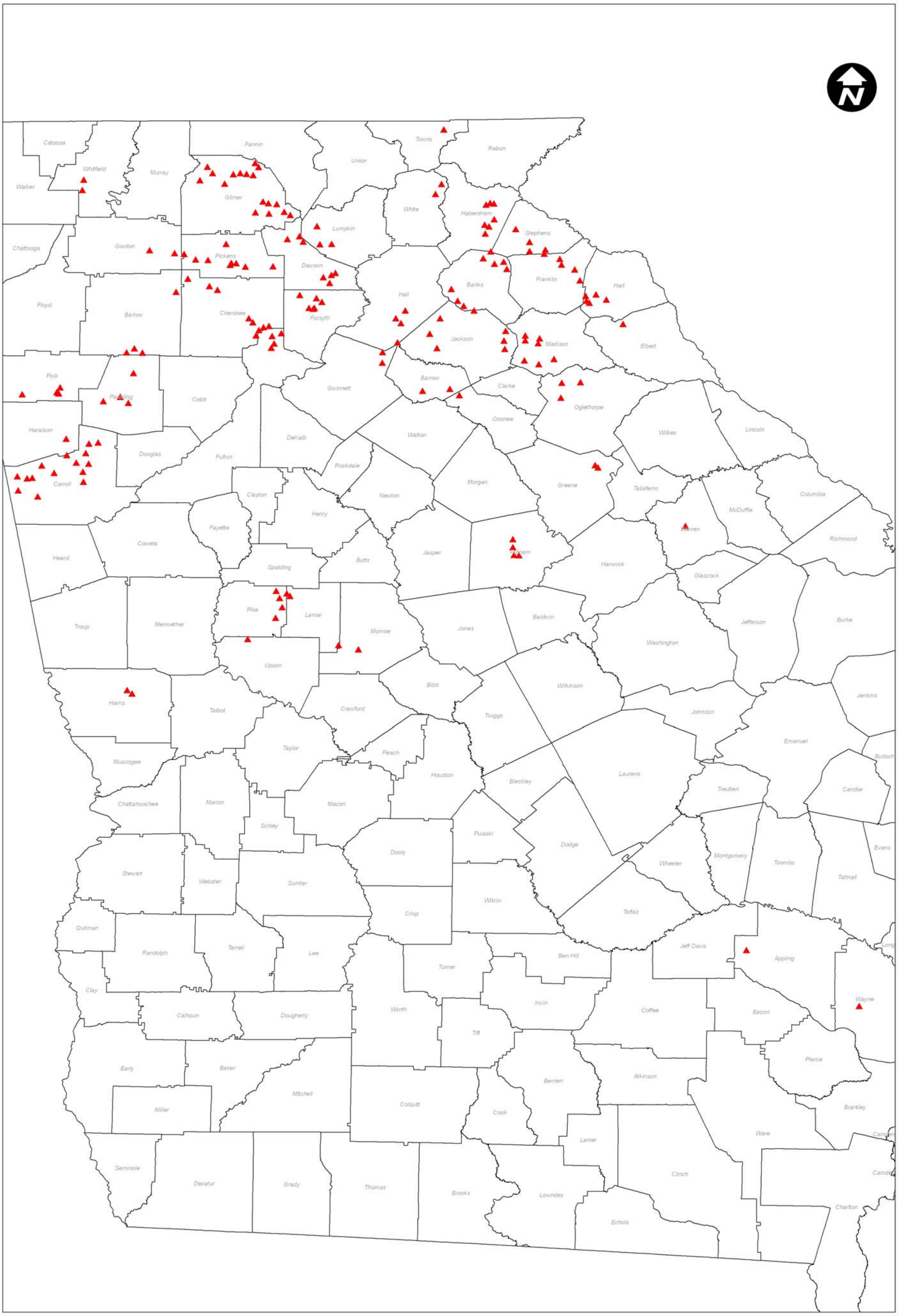
PREFACE

The results of the analyses presented herein are based upon United States Geological Survey (USGS) quadrangle maps and, therefore, should be utilized for planning purposes only. If any of the subject projects are identified as having a possibility of progressing past this analysis, additional studies will be required. These studies will include but not be limited to detailed environmental evaluations, detailed yield analyses, preliminary engineering design, and detailed cost estimating. These additional studies will be required prior to beginning detailed design work and/or land acquisition. The level of study presented herein shall be considered as a screening tool to evaluate the one project strengths and weaknesses relative to other projects. Until further studies are performed, actual yield and environmental factors associated with each project can not be readily determined.

DESCRIPTION OF STUDY

Evaluation Factors/Methodology

The GSWCC initiated this study in an attempt to determine which, if any, of the 357 watershed projects located throughout the state could be modified to serve as water supply reservoirs. Most of the watershed projects were constructed in the upper reaches of the watersheds. Therefore, the safe yield or the amount of water that the reservoir and associated drainage basin could supply in a drought would be limited. The GSWCC, with assistance from the Georgia Environmental Protection Division, performed an initial assessment that eliminated 191 projects from consideration based upon either drainage basin area or the project's proximity to urban areas. The remaining 166 projects were further evaluated by the consultant team of Schnabel and JJG based upon environmental impacts, infrastructure impacts, and potential yield. Figure 1 shows the location of the 166 dams while Table 1 lists these same dams. The purpose of the further evaluation was to identify twenty projects that had a relatively moderate potential for environmental and infrastructure impact while still providing a safe yield in an area of the state that was in need of a sustainable water supply.



1 inch equals 23 miles

0 11.5 23 46 Miles

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Assessment of NRCS SWCD Dams Georgia	166 Dams
	Figure 1 Project No. 07170030

Table 1
List of Studied Dams

DAM NAME	RIVER	COUNTY
AMICALOLA CR 2	TRI. OF LITTLE AMICALOLA CK	Dawson
AMICALOLA CR 3	COCHRANS CR	Dawson
AMICALOLA CR 4	GAB CR	Dawson
BARBER CR 06	BARBER CR	Barrow
BARBER CR 26	BARBER CR TRIB.	Oconee
BEAVERDAM CR 04	S.BEAVERDAM CR-TR	Hart
BEAVERDAM CR 05	S. BEAVERDAM CR-TR.	Hart
BEAVERDAM CR 06	S. BEAVERDAM CR TRIB.	Hart
BEAVERDAM CR 08	MOREA CR	Hart
BEAVERDAM CR 17	CLARKS CR	Hart
BEAVERDAM CR 30	LITTLE BEAVERDAM CR	Elbert
BIG CEDAR CR 32	LIME BRANCH	Polk
BISHOP CR 7	BISHOP CR	Appling
CARTECAY RVR 01	ROLSTON CR	Gilmer
CARTECAY RVR 03	HOLDEN CR	Gilmer
CARTECAY RVR 05	STOVER CR	Gilmer
CARTECAY RVR 06	WEAVER CR	Gilmer
CARTECAY RVR 07	TICKANETLEY CR	Gilmer
CARTECAY RVR 08	TRI. OF TICKANETLEY CR	Gilmer
CARTECAY RVR 10	LICKLOG CR	Gilmer
ELLIJAY RVR 01	FLAT BRANCH	Gilmer
ELLIJAY RVR 03	AMY CR	Gilmer
ELLIJAY RVR 04	BOARDTOWN CR	Gilmer
ELLIJAY RVR 09	ROCK CR	Gilmer
ELLIJAY RVR 10	CHERRY LOG CR	Gilmer
ELLIJAY RVR 11	SISSON CR	Gilmer
ELLIJAY RVR 12	LAUREL CR	Gilmer
ETOWAH RVR 01	BREWTON CR	Forsyth
ETOWAH RVR 09	TRIB. OF ETOWAH RVR	Dawson
ETOWAH RVR 10	MILL CR	Dawson
ETOWAH RVR 12	PALMER CR	Dawson
ETOWAH RVR 13	RUSSELL CR	Dawson
ETOWAH RVR 25	MILL CR	Lumpkin
ETOWAH RVR 26	HURRICANE CR	Lumpkin
ETOWAH RVR 32	JONES CR	Lumpkin
EUHARLEE CR 49	PARHAM SPRINGS	Polk
EUHARLEE CR 51	EUHARLEE CR-TR.	Polk
EUHARLEE CR 76	EUHARLEE CR	Polk
GROVE RVR 21	GROVE RVR	Banks
GROVE RVR 25	GROVE RVR TRIB.	Banks
GROVE RVR 33	GROVE CR	Jackson
GROVE RVR 59	GROVE CR	Banks
HAZEL CR 12	HAZEL CR	Habersham
HAZEL CR 19	FRANKLIN BRANCH	Habersham

HAZEL CR 21	LITTLE HAZEL CR	Habersham
HIGHTOWER CR 25	HASS CR	Towns
LITTLE RVR 07	LITTLE RVR	Haralson
LITTLE RVR 15	LITTLE RVR TRIB.	Cherokee
LITTLE RVR 17	LITTLE RVR TRIB.	Cherokee
LITTLE RVR 19	LITTLE RVR TRIB.	Cherokee
LITTLE RVR 21	LITTLE RVR TRIB.	Cherokee
LITTLE RVR 25	CHICKEN CR	Fulton
LITTLE RVR 27	CHICKEN CR TRIB.	Fulton
LITTLE RVR 31	CHICKEN CR TRIB.	Fulton
LITTLE RVR 36	COPPER SANDY CR	Fulton
LITTLE SANDY-TRAIL CR 06	EAST SANDY CR	Madison
LITTLE SATILLA CR 07	DRY CR	Wayne
LITTLE TALLAPOOSA RVR 06	SHARPE CR	Carroll
LITTLE TALLAPOOSA RVR 16	BETHEL CR	Carroll
LITTLE TALLAPOOSA RVR 19	HOMINEY CR	Carroll
LITTLE TALLAPOOSA RVR 20	HENDRICKS CR	Carroll
LITTLE TALLAPOOSA RVR 21	TR. LITTLE TALLAPOOSA RVR	Carroll
LITTLE TALLAPOOSA RVR 30	TRESTLE CR	Carroll
LITTLE TALLAPOOSA RVR 31	ASTIN CR	Carroll
LONG SWAMP CR 14	EAST BRANCH	Pickens
LOWER LITTLE TALLAPOOSA RVR 14	INDIAN CR	Carroll
LOWER LITTLE TALLAPOOSA RVR 19		Carroll
LOWER LITTLE TALLAPOOSA RVR 25	TURKEY CR TRIB.	Carroll
LOWER LITTLE TALLAPOOSA RVR 35	TURKEY CR	Carroll
LOWER LITTLE TALLAPOOSA RVR 74	TURKEY CR TRIB.	Carroll
LOWER LITTLE TALLAPOOSA RVR 80	BIG INDIAN CR TRIB.	Carroll
LOWER LITTLE TALLAPOOSA RVR 82	BIG INDIAN CR TRIB.	Carroll
LOWER LITTLE TALLAPOOSA RVR 93	BIG INDIAN CR TRIB.	Carroll
MARBURY CR 22	MARBURY CR	Barrow
MIDDLE FORK BROAD RVR 06	WHITEHOUSE CR	Banks
MIDDLE FORK BROAD RVR 17	BRADY CR	Banks
MIDDLE FORK BROAD RVR 28	TATES CR	Banks
MIDDLE FORK BROAD RVR 30	CASH CR	Banks
MIDDLE FORK BROAD RVR 44	MIDDLE FORK BROAD RVR	Habersham
MIDDLE OCONEE-WALNUT CR 01	WALNUT CR	Hall
MIDDLE OCONEE-WALNUT CR 03	CANDLER BRANCH	Hall
MIDDLE OCONEE-WALNUT CR 06	MOUNTAIN CR	Jackson
MIDDLE OCONEE-WALNUT CR 07	ALLEN CR	Hall
MIDDLE OCONEE-WALNUT CR 12	TR. POND FORK CR	Jackson
MIDDLE OCONEE-WALNUT CR 18	DOSTERS CR	Jackson
MILL CR 07	MILL CR	Whitfield
MILL CR 08	HURRICANE CR	Whitfield
MILL-CANTON CRS 04	MILL CR	Cherokee
MILL-CANTON CRS 07	CANTON CR	Cherokee
MOUNTAINTOWN CR 1	EAST MOUNTAINTOWN CK	Gilmer
MOUNTAINTOWN CR 2	MOUNTAINTOWN CR	Gilmer
MOUNTAINTOWN CR 3	CONASAUGA CR	Gilmer
NORTH BROAD RVR 28	DOUBLE BRANCH	Franklin

NORTH BROAD RVR 32	TR. CLARKS CR	Franklin
NORTH BROAD RVR 33	TR. CLARKS CR	Franklin
NORTH BROAD RVR 38	BEAR CR	Franklin
NORTH FORK BROAD RVR 01	TR. NORTH FORK BROAD R.	Stephens
NORTH FORK BROAD RVR 04	FREEMAN CR	Stephens
NORTH FORK BROAD RVR 05	MAG. CR	Stephens
NORTH FORK BROAD RVR 06	BEAR CR	Stephens
NORTH FORK BROAD RVR 11	BIG TOMS CR	Stephens
PALMETTO CR 01	PALMETTO CR	Harris
PALMETTO CR 10	BEAVER CR	Harris
PINE LOG TRIBUTARY 25	SUGAR HILL CR	Bartow
POTATO CR 006	TEN MILE CR	Upson
POTATO CR 056	HONEY BEE CR	Pike
POTATO CR 058	HONEY BEE CR TRIB.	Pike
POTATO CR 066	LITTLE POTATO CR	Pike
POTATO CR 078	HONEY BEE CR	Lamar
POTATO CR 082	BIG POTATO CR TRIB.	Pike
POTATO CR 115	BIG POTATO CR	Lamar
PUMPKINVINE CR 02	WARD CR	Bartow
PUMPKINVINE CR 08	TR. PUMPKINVINE CR	Paulding
PUMPKINVINE CR 11	TR. PUMPKINVINE CR	Paulding
PUMPKINVINE CR 16	WEST FORK CR	Paulding
PUMPKINVINE CR 50	TR. PUMPKINVINE CR	Paulding
RACCOON CR 07	RICHLAND CR	Bartow
RACCOON CR 08	TR. ETOWAH RVR	Bartow
ROCKY COMFORT CR 14	WHETSTONE CR	Warren
ROOTY CR 05	TR. ROOTY CR	Putnam
ROOTY CR 20	ROOTY CR	Putnam
ROOTY CR 21	TR. ROOTY CR	Putnam
ROOTY CR 27	LITTLE BRANCH	Putnam
SALLACOA CR 048	SALLACOA CR TRIB.	Pickens
SALLACOA CR 062	SALLACOA CR TRIB.	Gordon
SALLACOA CR 074	SALLACOA CR TRIB.	Cherokee
SALLACOA CR 100	SALLACOA CR TRIB.	Gordon
SANDY CR 08	NICHOLSON BRANCH	Jackson
SANDY CR 15	BIG SANDY CR	Jackson
SANDY CR 23	HARDEMAN CR	Jackson
SAUTEE CR 10	CHICKAMAUGA CR	White
SAUTEE CR 13	BEAN CR	White
SETTINGDOWN CR 10	SETTINGDOWN CR TRIB.	Forsyth
SETTINGDOWN CR 11	THALLEY CR	Forsyth
SETTINGDOWN CR 15	SETTINGDOWN CR TRIB.	Forsyth
SETTINGDOWN CR 16	SETTINGDOWN CR TRIB.	Forsyth
SETTINGDOWN CR 21	SQUATTINGDOWN CR	Forsyth
SHARP MOUNTAIN 01	PADGETT CR	Pickens
SHARP MOUNTAIN 02	SHARP MT. CR	Pickens
SHARP MOUNTAIN 12	SHARP MT. CR	Pickens
SHARP MOUNTAIN 22	TR. SHARP MT. CR	Pickens
SOQUE 29	LIBERTY CR	Habersham

SOQUE 34	ROBERTS BRANCH	Habersham
SOQUE 36	DEEP CR TRIB.	Habersham
SOQUE 44	GLADE CR	Habersham
SOUTH FORK BROAD RVR 06	LITTLE CLOUDS CR	Oglethorpe
SOUTH FORK BROAD RVR 19	HAWKS CR	Oglethorpe
SOUTH FORK BROAD RVR 65	TR. BIG CLOUDS CR	Oglethorpe
SOUTH FORK LITTLE RVR 26	THORNTON CR	Greene
SOUTH FORK LITTLE RVR 31	TUGGLE CR	Greene
SOUTH RVR 04	WOLF BRANCH	Madison
SOUTH RVR 27	SOUTH FORK BROAD RVR	Madison
SOUTH RVR 29	BRUSH CR	Madison
SOUTH RVR 31	BIGER CR	Madison
SOUTH RVR 46	WILLIAMS CR	Madison
SOUTH RVR 51	KELLEY CR	Madison
STAMP-SHOAL CRS 1	SHOAL CR	Cherokee
STAMP-SHOAL CRS 2	MCCORY CR	Cherokee
TALKING ROCK CR 01	BYRANT CR	Pickens
TALKING ROCK CR 02	SCARECORN CR	Pickens
TALKING ROCK CR 13	TALKING ROCK CR	Pickens
TOBESOFKEE CR 41	YELLOW CR	Monroe
TOBESOFKEE CR 70	LITTLE TOBESOFKEE CR	Lamar
UPPER MULBERRY RVR 07	DUNCAN CR	Gwinnett
UPPER MULBERRY RVR 08	COOPER CR	Hall
UPPER MULBERRY RVR 11	LITTLE MULBERRY RVR	Gwinnett

The study team's approach to analyzing the 166 dams consisted of developing a matrix where multiple parameters could be weighted so that impact of individual parameters could be determined. The weighting of individual parameters allowed the study team to evaluate which of the parameters impacted a project's potential to become a water supply reservoir. The matrix included the following:

- Safe yield
- Time to refill reservoir
- Number of structures
- Number of streets
- Cultural resources
- Historic structures
- Trout streams
- Warm water streams
- Impaired streams
- Open water wetlands
- Other wetlands
- Distance to downstream water intakes

- Endangered flora
- Endangered fauna
- Endangered communities

For the purposes of the matrix, only those items that were impacted by the proposed project were considered.

ENGINEERING FACTORS

Selection of Dam and Reservoir Parameters

The following assumptions or boundary conditions were established in attempt to provide evaluation equity between the products:

1. The maximum top of dam elevation would be selected such that only one saddle dam with a height of no more then one contour interval would be required. Contour intervals ranged from 20 to 40 feet, depending on the region of the state. Dams were raised between 0 feet and 465 feet.
2. The maximum top of dam elevation could not impact major infrastructure projects such as U.S Interstate Highways, Hospitals, Schools, or Military Bases.
3. The normal pool of the reservoir was established by providing the same volume of flood storage (acre-feet) to the raised reservoir as was provided in the original design
4. Pump storage would be considered for a project if a stream within two miles of the existing dam had a contributing watershed area of at least 50 square miles.

The process of developing the maximum dam height began with delineating the drainage area of each dam. The digitized USGS Hydrologic Unit Boundary Map was modified as necessary. Then contour intervals were digitized from USGS 7.5-minute Quadrangles upstream of the existing dam. It was assumed that the centerline of the higher dam would extend perpendicular to the contour lines. The digitization was performed on the WACOM DTZ-2100 Pen Display using ArcGIS. The contours were traced as polygon features at each contour interval from the normal pool of the existing dam increasing in elevation until the contour line crossed the drainage area boundary, indicating that impounded water would overtop the watershed boundary.

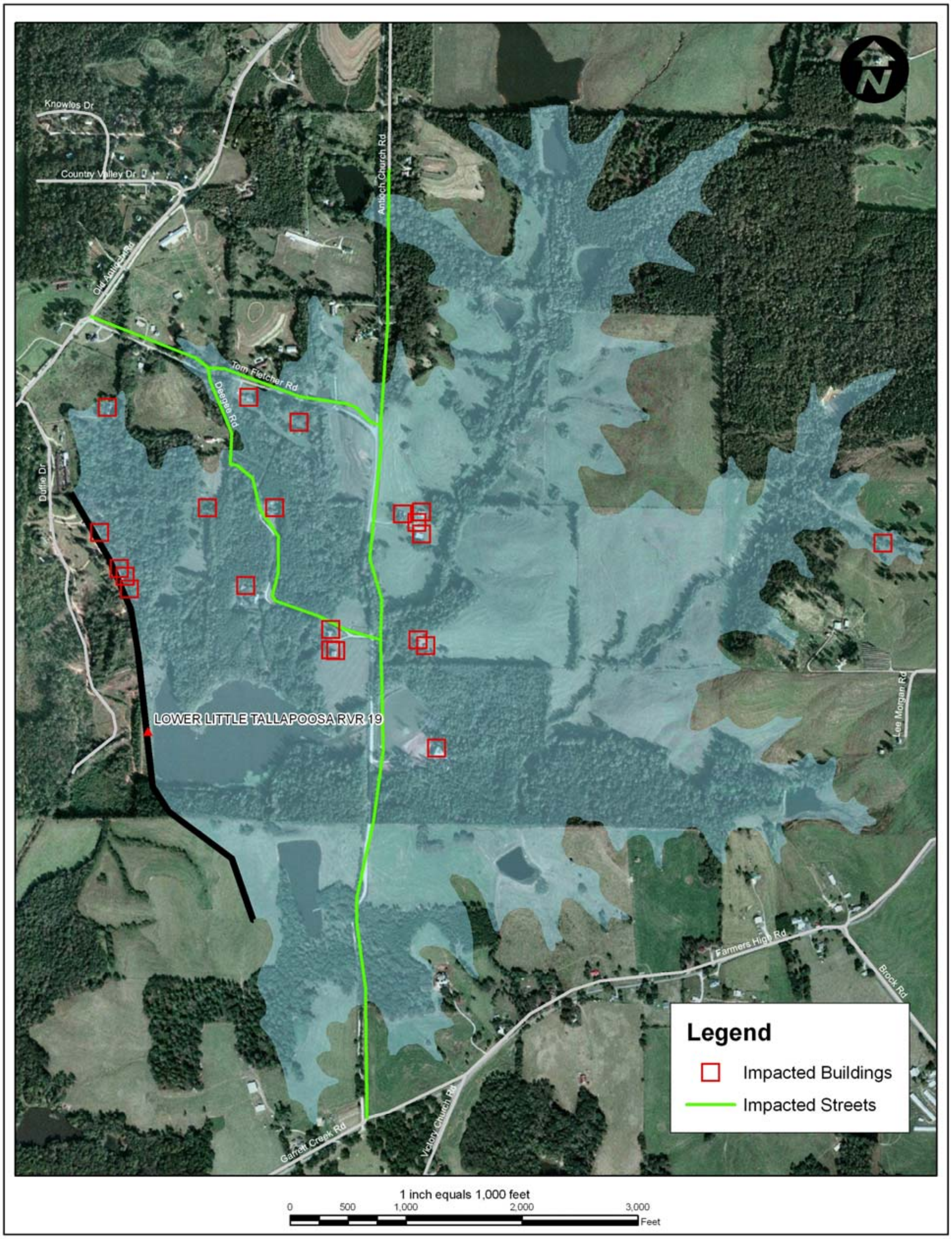
The footprint of the raised dam was also developed within ArcGIS. A 3.5 horizontal to 1 vertical slope was projected downstream from the centerline of the dam to form a polygon of the downstream slope of a dam embankment at its maximum height. This slope was considered to be a conservative estimate that includes the typical 3H:1V slope of the embankment plus berms and the top of dam. The results were summarized and included in a Microsoft Access database.

Impacted Facilities

The number of buildings impacted was estimated by digitizing the structures that fell within the contour lines using aerial photographs. These aerial photographs were obtained from the I3_Imagery_Prime_World_2D layer of ESRI's Online Services Beta Program. Most of these aerial photos are seamless color mosaic from various sources including 2-foot imagery for metropolitan areas and USDA NAIP and USGS enhanced DOQQ photos for all other areas. Dates of the aerial photos for Northern Georgia range from 2004-2006. The URL for the layer is: http://services.arcgisonline.com/v92/I3_Imagery_Prime_World_2D/MapServer?wsdl. Each structure was created into a point feature, and the number of structures calculated by the number of points which fell inside each water surface polygon. The same procedure was used for hospitals.

The number of streets was calculated using ESRI's Street Map USA. These streets are pre-digitized polylines broken down into street class. The streets were overlaid on the water surface contour polygons. A calculation was run to find the number of streets intersecting each water surface polygon to give a total number of streets affected by each new lake elevation. The same procedure was used for interstate highways.

Figure 2 shows an example of how the impacts were identified.



Knowles Dr
Country Valley Dr
Old Antioch Rd
Antioch Church Rd
Tom Fletcher Rd
Deepee Rd
Duffie Dr
LOWER LITTLE TALLAPOOSA RVR 19
Lee Morgan Rd
Farmers High Rd
Brock Rd
Garrett Creek Rd
Victory Church Rd
Legend
Impacted Buildings
Impacted Streets
1 inch equals 1,000 feet
0
500
1,000
2,000
3,000
Feet

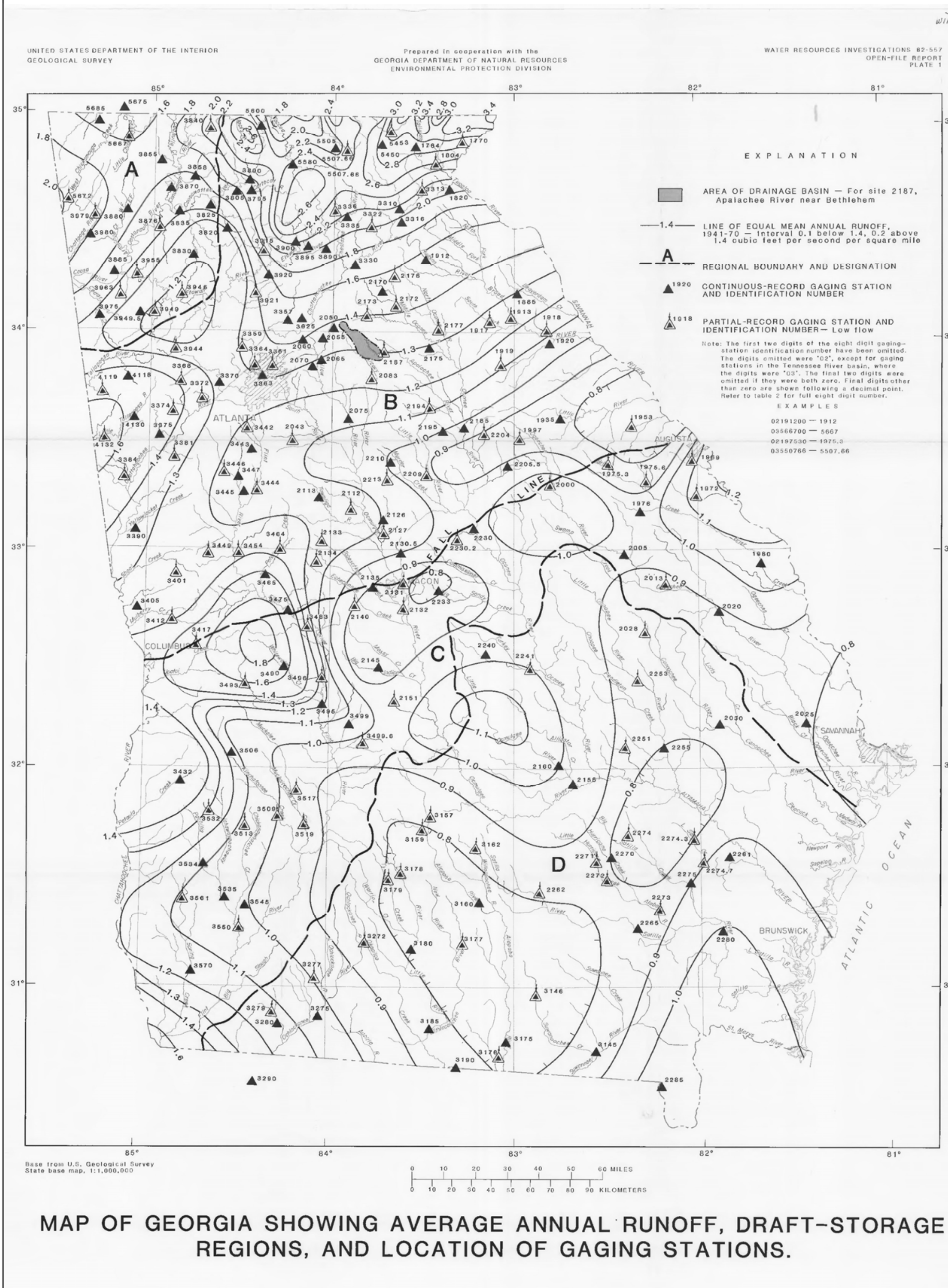
Figure 2

Yield Analyses

Reservoir safe yield is generally defined as the reliable withdrawal rate of acceptable quality water that can be provided by reservoir storage through a critical drought period. While total water demands during a defined drought condition are usually less than normal, this situation is typically offset by higher than average demands prior to the clear definition of a drought condition. Safe yield is dependent upon the storage and hydrologic (rainfall/runoff/evaporation) characteristics of the source and source facilities, the selected critical drought, upstream and downstream permitted withdrawals, and the minimum in-stream flow requirements.

For the initial phase of yield assessments, the safe yield of the 166 dams was estimated as follows. The study area was divided into six hydrologically-similar regions; with a representative stream gage selected for each region. Similar regions were initially identified as those having similar average annual runoff (as presented on Plate 1 of *Storage Requirements of Georgia Streams*, USGS Open-File Report 82-557), and subsequently by graphing of unit discharge (cfs per square mile of drainage area) of daily gage data for several streams in each area (see Figure 3). Of these, a representative stream gage was selected in each region based on length of record, drought periods reflected in the records, absence of significant in-basin withdrawals, and input from GAEPD. The various regions are presented in Figure 5, and the representative gages are presented below in Table 2. Figure 4 shows the comparison of monthly unit discharges for the six regions.

The yields presented in this report should be considered approximate. All yield calculations are based on topographic information from USGS quadrangle maps, which can have an appreciable effect on real reservoir storage volumes.



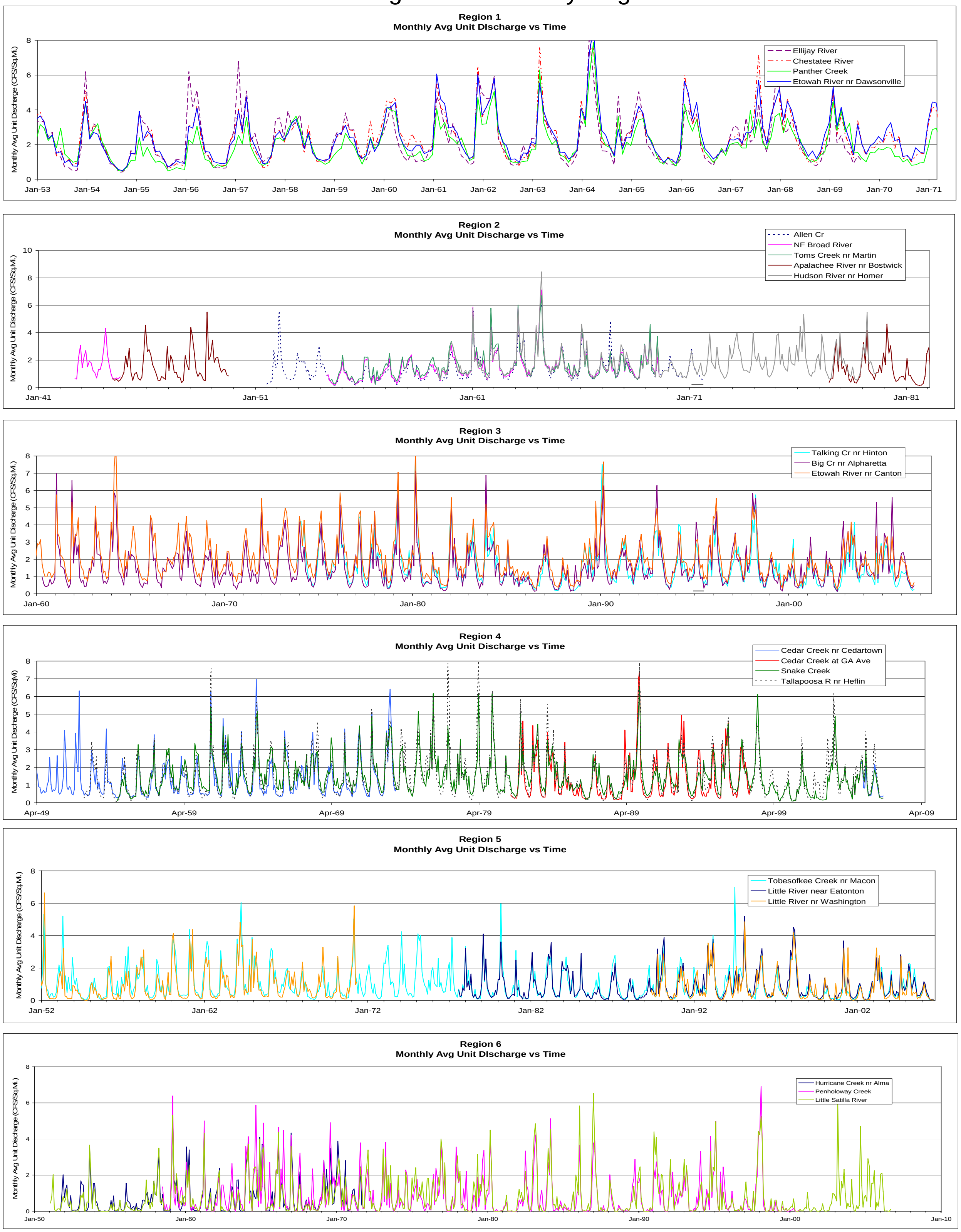
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
Prepared in cooperation with the
GEORGIA DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION
WATER RESOURCES INVESTIGATIONS 82-557
OPEN-FILE REPORT
PLATE 1
EXPLANATION
AREA OF DRAINAGE BASIN — For site 2187, Apalachee River near Bethlehem
LINE OF EQUAL MEAN ANNUAL RUNOFF, 1941-70 — Interval 0.1 below 1.4, 0.2 above 1.4 cubic feet per second per square mile
REGIONAL BOUNDARY AND DESIGNATION
CONTINUOUS-RECORD GAGING STATION AND IDENTIFICATION NUMBER
PARTIAL-RECORD GAGING STATION AND IDENTIFICATION NUMBER — Low flow
Note: The first two digits of the eight digit gaging-station identification number have been omitted. The digits omitted were "02", except for gaging stations in the Tennessee River basin, where the digits were "03". The final two digits were omitted if they were both zero. Final digits other than zero are shown following a decimal point. Refer to table 2 for full eight digit number.
EXAMPLES
02191200 — 1912
03566700 — 5667
02197530 — 1975.3
03550766 — 5507.66
ATLANTA
AUGUSTA
MACON
COLUMBUS
SAVANNAH
BRUNSWICK
ATLANTIC OCEAN
FALL LINE
A
B
C
D
Base from U.S. Geological Survey State base map, 1:1,000,000
60 MILES
90 KILOMETERS
MAP OF GEORGIA SHOWING AVERAGE ANNUAL RUNOFF, DRAFT-STORAGE REGIONS, AND LOCATION OF GAGING STATIONS.

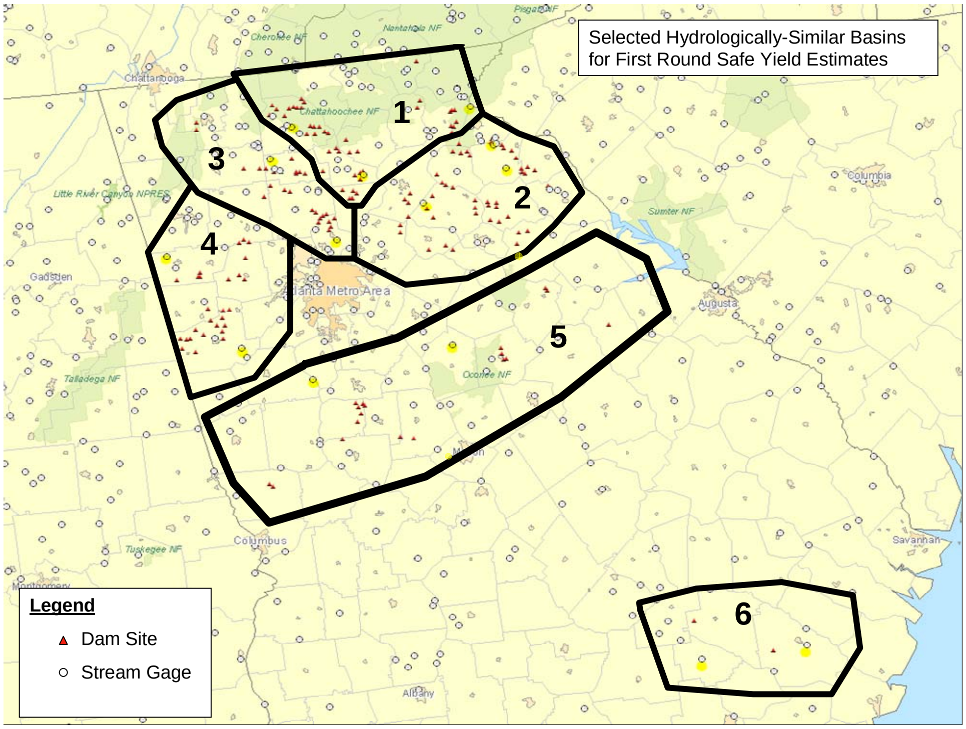
Figure 3

Table 2
Selected USGS Gages for Six Study Regions

Region	USGS Gage	Record Period
1	02333500 Chestatee River Near Dahlonega, GA	April 1940 - Present
2	02217000 Allen Creek At Talmo, GA	Aug 1951 – Sept 1971
3	02382200 Talking Rock Creek Near Hinton, GA	Nov 1973 - Present
4	02412000 Tallapoosa River Near Heflin, AL	July 1952 - Present
5	02193500 Little River Near Washington, GA	Oct 1949 – May 1971 May 1989 - Present
6	02227500 Little Satilla River Near Offerman, GA	Feb 1951 – Present

Figure 4: Comparison of Monthly Unit Discharges for Six Study Regions





Hydrological Regions
Figure 5

Where a reservoir is proximate to a nearby major stream, an evaluation was made of the safe yield that would be attainable by the addition of pumped diversions from the stream. Projects were screened for pumped-diversion based on the presence of at least a 50 square mile basin area located within a two mile radius from the dam.

A reservoir operations model was developed for each of the six regions incorporating the gage data of the selected USGS gage in each region and generalized reservoir shape parameters for estimation of evaporation. The following assumptions were incorporated into the analysis for the initial estimate of safe yield:

Assumptions:

1. Dead storage of 20% of gross reservoir storage was incorporated to allow for sediment storage and poor water quality in lower reservoir

strata.

2. Water supply storage for expanded reservoir sites (including dead storage) was estimated by subtracting existing flood and surcharge storage (between normal pool and top of dam) from maximum computed storage at top of proposed raised dam.
3. There was no consideration of upstream or downstream withdrawals in the initial assessment.
4. For dam sites, minimum in-stream flow (MIF) of 30/60/40 percent average annual flow (AAF)[1] was used.
5. For pumped-diversion sources, minimum in-stream flow of 30% AAF was used.
6. Evaporation loss was based upon net historical evaporation rates. Lake evaporation was assumed to be equal to 70% of pan evaporation during each month. Generalized reservoir shape parameters reflective of each region's physiography were incorporated into each model.
7. Direct drainage area ratio of gauging station to dam and pumped diversion drainage areas was applied to flows.
8. For sites considered as pumped-diversion projects, pump capacity was generally assumed to be in the range of 0.2 to 0.5 mgd/mi^2 of diversion drainage area, and typically did not exceed 1.7 times to 2.5 times the safe yield of the project. Pumped diversions in the model were bounded by pumping capacity and diversion MIF requirements.
9. Total seepage losses would be less than the MIF requirements and, therefore, did not need to be separately considered.
10. For the dam to be considered as a pump storage scheme, a large stream had to be within 2 miles of the existing dam and have a drainage area of at least 50 square miles.

The attainable safe yield during the analyzed period was found by iteration of the daily mass balance equation:

Ending Storage = (Beginning Storage) + (Natural Inflow) + (Pumped Inflow) – (Water Supply) – (Evaporation) – (MIF)

*Note pumped inflow only applied to pumped-storage projects.

[1] 30% AAF for July through November; 60% AAF for January through April; and 40% AAF for May, Jun and December. [Note: The 30/60/40 approach for in-stream flow is, by historical standards, a fairly severe basis. As the most feasible projects move beyond the scope of this study, it is likely that some, and perhaps many, sites could be permitted under a less severe standard that would result in higher safe yield values.]

The safe yield value was varied until the reservoir level reached the dead storage value, and recovery of the reservoir was assured. However, in several instances where very large reservoirs were simulated, recovery from the 1999-2001 drought was not attained.

Incorporating the above assumptions, the safe yield of each site was computed. The results of the on-stream safe yield analyses are presented in Table 3. The table presents the names of the dams with safe yield and refill time. In addition, notes are included in the table to denote special conditions encountered in the analysis. For example, for many sites the refill time of the reservoir extended more than 8 years, preventing refill from the 1999-2001 drawdown and thereby extending into the present drought. In many of these cases the safe yield was estimated based on simulated reservoir drawdown through September 2007. The continuation of the drought could cause reduction in safe yield for the assumed conditions.

Also of note in Table 3, several very large reservoirs never refilled in the simulation period (they were assumed full at the start of the record period). These reservoirs had drainage basins that were too small to support evaporation from the lake surface let alone withdrawals for water supply. For other sites, safe yield values were computed that allowed the reservoir (for the assumed maximum size) to refill at least once during the record drought period. In these instances the full storage was not utilized. For these sites, additional analyses would be required to identify more reasonable storage values able to be supported by the reservoir drainage areas.

Table 3 - Georgia NRCS Watershed Dams Safe Yield Assessment Safe Yield of On-Stream Sites								
					Based on Maximum Storage			
Dam Name	Region	D. A. (Sq.Mi.)	Max Storage (BG)	Existing Surcharge Storage (BG)	Available Water Supply Storage (Including Dead Storage) (BG)	Safe Yield (mgd)	Refill Time (Years)	Note
Amicalola Creek 02	1	4.38	3.69	0.56	3.13	2.1	7	
Amicalola Creek 03	1	6.08	8.00	0.72	7.28	4.2	13	C
Amicalola Creek 04	1	4.13	2.70	0.36	2.34	1.8	7	
Barber Creek 06	2	5.84	22.87	0.17	22.70	0	N	
Barber Creek 26	2	2.01	3.03	0.16	2.87	0.2	15	F
Beaver Dam Creek 04	2	0.94	2.42	0.09	2.33	0	N	N
Beaver Dam Creek 05	2	1.15	2.49	0.16	2.33	0	N	N
Beaver Dam Creek 06	2	1.56	0.19	0.19	0.00	0	N	N
Beaver Dam Creek 08	2	4.39	19.64	0.57	19.07	0	N	N
Beaver Dam Creek 17	2	5.36	7.60	0.83	6.77	1.4	15	F
Beaver Dam Creek 30	2	22.61	18.97	2.40	16.57	8.6	10	
Big Cedar Creek 32	4	3.83	2.88	0.90	1.98	1	11	C
Bishop Creek 07	6	18.73	1.40	0.64	0.76	0		
Cartecay River 01	1	9.06	3.82	1.00	2.82	3.15	5	
Cartecay River 03	1	6.42	1.64	0.78	0.86	1.75	5	
Cartecay River 05	1	4.45	4.16	0.64	3.52	2.3	9	C
Cartecay River 06	1	2.12	11.50	0.23	11.27	0.4	35	F, C
Cartecay River 07	1	2.84	17.76	0.38	17.38	0.6	39	F, C
Cartecay River 08	1	15.52	12.97	1.33	11.64	8.4	9	C
Cartecay River 10	1	6.60	0.83	0.65	0.18	0.7	1	
Ellijay River 01	1	8.38	4.71	0.89	3.82	3.4	6	
Ellijay River 03	1	3.50	2.51	0.42	2.09	1.5	7	
Ellijay River 04	1	9.07	9.01	1.10	7.91	5.2	9	C
Ellijay River 09	1	6.59	4.22	1.01	3.21	2.7	6	
Ellijay River 10	1	14.59	1.05	1.00	0.05	0.4	1	
Ellijay River 11	1	1.35	1.03	0.18	0.85	0.54	7	
Ellijay River 12	1	1.95	1.18	0.32	0.86	0.7	6	
Etowah River 01	1	6.74	9.38	0.60	8.78	4.8	27	
Etowah River 09	1	1.87	0.54	0.20	0.34	0.5	5	
Etowah River 10	1	2.13	11.39	0.26	11.13	0.4	34	F, C
Etowah River 12	1	3.76	1.31	0.41	0.90	1.14	5	
Etowah River 13	1	2.82	5.19	0.34	4.85	1.9	36	C
Etowah River 25	1	2.90	5.35	0.39	4.96	2	39	C
Etowah River 26	1	10.82	2.22	1.14	1.08	2.85	3	
Etowah River 32	1	9.14	9.05	1.46	7.59	5.1	9	C
Euharlee Creek 49	4	2.38	0.56	0.25	0.31	0.35	4	
Euharlee Creek 51	4	1.38	0.82	0.17	0.65	0.23	11	C
Euharlee Creek 76	4	3.63	0.44	0.34	0.10	0.21	1	
Grove River 21	2	0.97	1.24	0.01	1.23	0.025	15	F
Grove River 25	2	1.33	6.91	0.22	6.69	0	N	N
Grove River 33	2	2.32	7.09	0.35	6.74	0	N	N
Grove River 59	2	12.88	24.57	2.03	22.54	3.5	13	F
Hazel Creek 12	1	2.86	0.27	0.25	0.02	0.12	1	
Hazel Creek 19	1	1.51	1.17	0.21	0.96	0.62	7	
Hazel Creek 21	1	2.01	4.18	0.46	3.72	1.3	40	C
Hightower Creek 25	1	2.07	24.54	0.17	24.37	0	N	N
Little River 15	3	1.68	4.16	0.19	3.97	0.3	13	C
Little River 17	3	1.09	0.92	0.10	0.82	0.37	9	C
Little River 19	3	1.19	1.16	0.16	1.00	0.4	11	
Little River 21	3	4.86	0.94	0.39	0.55	0.8	2	
Little River 25	3	9.73	9.44	0.61	8.83	4.4	11	C
Little River 27	3	3.27	3.24	0.38	2.86	1.3	11	C
Little River 31	3	3.12	0.88	0.40	0.48	0.57	4	
Little River 36	3	3.24	2.90	0.35	2.55	1.2	9	C
Little River 7	4	3.62	8.05	0.71	7.34	0.5	27	F, C

C= Current drought controls; does not refill using current data
N= Never refills to normal pool over period of record (66 yrs)
F=Fraction of storage used. Safe Yield based on requirement to refill at least once in analysis period.
Existing Surcharge Storage= Storage Between Top of Dam + Normal Pool

Table 3 - con't								
					Based on Maximum Storage			
Dam Name		**D. A. (Sq.Mi.)**	**Max Storage (BG)**	**Existing Surcharge Storage (BG)**	**Available Water Supply Storage (Including Dead Storage) (BG)**	**Safe Yield (mgd)**	**Refill Time (Years)**	**Note**
Little Sandy Trail Creek 6	2	3.02	8.32	0.35	7.97	0	N	N
Little Satilla Cr 07	6	28.20	3.84	1.00	2.84	0		
Little Tallapoosa River 16	4	8.90	3.43	0.95	2.48	2.2	5	
Little Tallapoosa River 19	4	8.88	10.28	0.24	10.04	3.3	23	C
Little Tallapoosa River 20	4	5.18	10.00	0.78	9.22	1.3	27	F, C
Little Tallapoosa River 21	4	3.13	2.66	0.52	2.14	0.9	15	C
Little Tallapoosa River 30	4	8.86	19.40	1.55	17.85	2.6	27	F, C
Little Tallapoosa River 31	4	5.66	5.99	0.94	5.05	1.9	22	C
Long Swamp Creek 14	1	9.89	16.77	1.86	14.91	7.6	34	C
Lower Little Tallapoosa Rvr 08	4	3.55	1.17	0.48	0.69	0.65	5	
Lower Little Tallapoosa Rvr 14	4	4.13	7.08	0.37	6.71	1	27	F, C
Lower Little Tallapoosa Rvr 19	4	2.66	7.58	0.82	6.76	0	N	N
Lower Little Tallapoosa Rvr 25	4	4.84	13.87	1.34	12.53	0.4	27	F, C
Lower Little Tallapoosa Rvr 35	4	6.34	18.00	0.50	17.50	0.7	26	F, C
Lower Little Tallapoosa Rvr 74	4	2.79	8.62	1.51	7.11	0	N	N
Lower Little Tallapoosa Rvr 80	4	7.37	7.95	0.51	7.44	2.65	23	C
Lower Little Tallapoosa Rvr 82	4	2.78	12.11	0.93	11.18	0	N	N
Lower Little Tallapoosa Rvr 93	4	4.62	12.78	0.57	12.21	0.3	27	F, C
Marbury Creek 22	2	2.28	6.66	0.32	6.34	0	N	N
Middle Fork Broad River 06	2	3.01	1.26	0.25	1.01	0.7	8	
Middle Fork Broad River 17	2	2.69	2.68	0.21	2.47	0.75	16	F
Middle Fork Broad River 28	2	2.45	13.12	0.23	12.89	0	N	N
Middle Fork Broad River 30	2	2.15	1.49	0.18	1.31	0.53	10	
Middle Fork Broad River 44	2	20.09	2.05	1.30	0.75	2.3	1	
Middle Oconee-Walnut Cr 01	2	6.08	15.57	1.01	14.56	0.7	14	F
Middle Oconee-Walnut Cr 03	2	1.76	2.02	0.22	1.80	0.35	15	F
Middle Oconee-Walnut Cr 06	2	2.53	3.88	0.30	3.58	0.35	15	F
Middle Oconee-Walnut Cr 07	2	3.95	10.66	0.65	10.01	0.12	17	F
Middle Oconee-Walnut Cr 12	2	3.14	7.49	0.61	6.88	0.1	14	F
Middle Oconee-Walnut Cr 18	2	2.99	6.47	0.36	6.11	0.15	14	F
Mill Creek 7	3	12.87	112.0	1.01	110.99	2	8	F, C
Mill Creek 8	3	2.90	7.75	0.35	7.40	0.7	13	F, C
Mill-Canton Creeks 4	3	4.55	11.79	0.51	11.28	1.3	13	F, C
Mill-Canton Creeks 7	3	3.36	4.69	0.32	4.37	1.2	13	F, C
Mountaintown Creek 01	1	10.18	3.45	1.76	1.69	2.95	5	
Mountaintown Creek 02	1	8.80	2.64	0.80	1.84	2.7	5	
Mountaintown Creek 03	1	5.85	3.19	0.37	2.82	2.37	6	
North Broad River 28	2	3.66	18.39	0.44	17.95	0	N	N
North Broad River 32	2	1.90	1.83	0.23	1.60	0.48	15	F
North Broad River 33	2	2.83	0.32	0.26	0.06	0.18	1	
North Broad River 38	2	5.41	7.37	0.76	6.61	1.5	15	F
North Fork Broad River 01	2	3.38	0.20	0.20	0.00	0		
North Fork Broad River 04	2	2.98	7.46	0.52	6.94	0.01	15	F
North Fork Broad River 05	2	1.68	2.33	0.19	2.14	0.2	15	F
North Fork Broad River 06	2	3.50	7.17	0.55	6.62	0.35	14	F
North Fork Broad River 11	2	3.49	5.96	0.54	5.42	0.55	14	F
Palmetto Creek 01	5	6.13	2.42	0.03	2.39	0.8	9	C
Palmetto Creek 10	5	3.67	12.03	0.60	11.43	0	N	N
Pine Log Tributary 25	3	2.66	0.41	0.40	0.01	0.035	1	
Potato Creek 006	5	3.91	12.69	0.55	12.14	0	N	N
Potato Creek 056	5	6.65	6.09	0.91	5.18	0.9	23	C
Potato Creek 058	5	4.40	3.33	0.66	2.67	0.5	14	C
Potato Creek 066	5	7.66	0.67	0.63	0.04	0.07	1	
Potato Creek 078	5	6.22	3.48	1.00	2.48	0.8	9	C
Potato Creek 082	5	4.88	12.05	0.74	11.31	0	N	N
Potato Creek 115	5	14.90	4.85	1.68	3.17	2.4	9	C
Pumpkinvine Creek 02	4	4.20	2.41	0.07	2.34	1.2	11	C
Pumpkinvine Creek 08	4	3.85	13.39	0.69	12.70	0	N	N
Pumpkinvine Creek 11	4	3.71	1.23	0.58	0.65	0.66	5	
Pumpkinvine Creek 16	4	2.89	8.27	0.42	7.85	0	N	N
Pumpkinvine Creek 50	4	2.59	9.22	0.47	8.75	0	N	N

C= Current drought controls; does not refill using current data
N= Never refills to normal pool over period of record (66 yrs)
F=Fraction of storage used. Safe Yield based on requirement to refill at least once in analysis period.
Existing Surcharge Storage= Storage Between Top of Dam + Normal Pool

		Table 3 - con't						
					Based on Maximum Storage			
Dam Name		D. A. (Sq.Mi.)	Max Storage (BG)	Existing Surcharge Storage (BG)	Available Water Supply Storage (Including Dead Storage) (BG)	Safe Yield (mgd)	Refill Time (Years)	Note
Raccoon Creek 7	4	3.62	4.90	0.46	4.44	1	24	C
Raccoon Creek 8	4	1.38	3.37	0.17	3.20	0	N	N
Rocky Comfort Creek 14	5	4.19	6.63	0.69	5.94	0	N	N
Rooty Creek 05	5	1.41	3.91	0.18	3.73	0	N	N
Rooty Creek 20	5	1.65	1.92	0.21	1.71	0	N	N
Rooty Creek 21	5	1.85	8.06	0.23	7.83	0	N	N
Rooty Creek 27	5	4.73	4.77	0.63	4.14	0.4	24	F, C
Sallacoa Creek 048	3	2.73	8.50	0.52	7.98	0.5	13	F, C
Sallacoa Creek 062	3	3.53	0.33	0.32	0.01	0.035	1	C
Sallacoa Creek 074	3	1.29	7.97	0.25	7.72	0	N	N
Sallacoa Creek 100	3	1.47	0.21	0.20	0.01	0.034	1	C
Sandy Creek 08	2	3.14	14.54	0.38	14.16	0	N	
Sandy Creek 15	2	3.95	5.99	0.56	5.43	0.8	14	F
Sandy Creek 23	2	4.13	11.22	0.58	10.64	0.1	14	F
Sautee Creek 10	1	3.19	0.39	0.24	0.15	0.47	1	
Sautee Creek 13	1	2.95	3.64	0.22	3.42	1.88	13	C
Settingdown Creek 10	1	1.01	1.46	0.12	1.34	0.63	28	C
Settingdown Creek 11	1	3.81	0.72	0.55	0.17	0.54	1	
Settingdown Creek 15	1	1.65	0.34	0.30	0.04	0.14	1	
Settingdown Creek 16	1	1.61	1.86	0.22	1.64	0.88	10	C
Settingdown Creek 21	1	3.03	5.75	0.31	5.44	2.1	40	C
Sharp Mountain 01	3	4.09	3.13	0.48	2.65	1.6	9	C
Sharp Mountain 02	3	2.45	1.41	0.06	1.35	0.8	9	
Sharp Mountain 12	3	5.62	8.23	0.66	7.57	2.3	13	F, C
Sharp Mountain 22	3	3.43	7.36	0.47	6.89	1	13	F, C
Soque 29	1	3.87	0.66	0.46	0.20	0.62	1	
Soque 34	1	6.41	4.07	0.71	3.36	2.72	7	
Soque 36	1	3.39	5.24	0.32	4.92	2.35	33	
Soque 44	1	2.65	2.46	0.63	1.83	1.2	7	
South Fork Broad River 06	2	5.37	8.42	0.76	7.66	1.3	14	F
South Fork Broad River 19	2	6.23	17.32	0.95	16.37	0.5	13	F
South Fork Broad River 65	2	3.26	6.93	0.44	6.49	0.2	14	F
South Fork Little River 26	5	5.47	5.52	0.35	5.18	0.4	24	F. C
South Fork Little River 31	5	4.56	28.14	0.30	27.84	0	N	N
South River 04	2	2.89	4.78	0.49	4.29	0.45	16	F
South River 27	2	19.73	14.49	3.17	11.32	6.8	10	
South River 29	2	29.48	22.83	3.53	19.30	11	10	
South River 31	2	4.90	21.63	0.79	20.84	0	N	
South River 46	2	3.06	12.11	0.53	11.58	0	N	
South River 51	2	2.88	6.18	0.33	5.85	0.1	14	F
Stamp-Shoal Creeks 1	3	10.34	8.40	1.53	6.87	4.3	9	C
Stamp-Shoal Creeks 2	3	3.62	13.60	0.45	13.15	0.6	10	F, C
Talking Rock Creek 01	3	3.72	1.65	0.70	0.95	0.85	4	
Talking Rock Creek 02	3	4.87	2.10	0.88	1.22	1.1	4	
Talking Rock Creek 13	3	8.35	4.56	1.82	2.74	2.3	5	
Tobesofkee Creek 41	5	7.82	16.13	1.20	14.93	0	N	N
Tobesofkee Creek 70	5	15.97	20.24	2.31	17.93	1.7	15	F, C
Upper Mulberry River 07	2	2.74	3.34	0.04	3.30	0.5	12	F
Upper Mulberry River 08	2	2.84	3.02	0.39	2.63	0.8	16	F
Upper Mulberry River 11	2	6.36	62.89	1.21	61.68	0	N	

C= Current drought controls; does not refill using current data

N= Never refills to normal pool over period of record (66 yrs)

F=Fraction of storage used. Safe Yield based on requirement to refill at least once in analysis period.

Existing Surcharge Storage= Storage Between Top of Dam + Normal Pool

The results of the pumped-storage yield analyses are presented in Table 4. In addition to the data presented in this table, other information is also tabulated, including diversion drainage area, straight-line distance to the diversion source, and pump capacity. These initial analyses did not incorporate spillway sizing for the probable maximum flood, nor did they account for upstream and downstream withdrawals at the diversion source. The tabulated values represent maximum values that will likely be reduced in subsequent detailed safe yield analyses.

A dam was considered a pump storage site if a larger stream, with a drainage area exceeding 50 square miles, was within 2 miles of the reservoir.

Distance to Downstream Intake

Several GIS coverages were required to quantify this factor. The same USGS stream coverages described in the environmental stream impact section were used here as well. The downstream path from each reservoir was extracted. In some cases, additional county stream coverages were required to contiguously map the stream path from the dam to the downstream intake.

There was not a readily available GIS coverage of existing intake locations. A GIS coverage from an older issue of the Digital Environmental Atlas of Georgia CD set was available. In addition, a GIS coverage of water supply watersheds was available from the Georgia Clearinghouse. GIS points were created at the most downstream limit of the water supply watersheds. These points were combined with the older Atlas intake locations to produce a single coverage of intake locations. The combined locations were compared to locations described in the document "Water Use in Georgia by County for 2000, Information Circular 106, Julia Fanning, USGS, Atlanta, 2003". New locations were created or existing locations moved as required resulting in a final intake location point coverage.

The downstream contiguous stream paths from each dam to the nearest downstream intake location were extracted for each dam. Impacts were measured as the linear stream distance in feet from the dam to the intake location. Those dams that did not have a downstream intake location were given a distance equal to twice the distance of the longest actual measured distance.

Table 4 - Georgia NRCS Watershed Dams Safe Yield Assessment
Safe Yield of Pumped Storage Sites

Dam Name	Region	Straight Pipe Length (miles)	Diversion River Name	Diversion D.A. (sq.mi)	Dam D.A. (sq.mi.)	Water Supply Storage (BG)	Pump Capacity (mgd)	Safe Yield (mgd)	Refill Time (Years)
CARTECAY RVR 01	1	0.4	CARTECAY R	57	9.06	2.82	20	12.6	3
CARTECAY RVR 03	1	0.9	CARTECAY R	51	6.42	0.86	8	4.6	1
CARTECAY RVR 10	1	1.7	CARTECAY R	66	6.60	0.18	3	1.3	1
ELLIJAY RVR 01	1	1.8	ELLIJAY R	75	8.38	3.82	30	17	3
ETOWAH RVR 01	1	1.5	ETOWAH R	310	6.74	8.78	75	42.4	2
ETOWAH RVR 09	1	0.7	ETOWAH R	117	1.87	0.34	10	2.6	1
ETOWAH RVR 10	1	0.9	ETOWAH R	120	2.13	11.13	80	36.6	4
ETOWAH RVR 12	1	1.0	ETOWAH R	110	3.76	0.9	15	5.6	1
ETOWAH RVR 13	1	0.9	ETOWAH R	104	2.82	4.85	40	21.6	3
ETOWAH RVR 26	1	0.4	ETOWAH R	62	10.82	1.08	10	5.9	1
LITTLE SATILLA CR 07	6	2.0	SATILLA CR	110	28.20	3.84	55	0.5	4
LITTLE TALLAPOOSA RVR 19	4	0.7	LITTLE TALLAPOOSA R	53	8.88	10.04	25	12.2	5
LITTLE TALLAPOOSA RVR 20	4	0.7	LITTLE TALLAPOOSA R	67	5.18	9.22	25	11.9	6
LOWER LITTLE TALLAPOOSA RVR 14	4	0.3	BIG INDIAN CR	55	4.13	6.71	20	9.2	5
LOWER LITTLE TALLAPOOSA RVR 19	4	1.6	LITTLE TALLAPOOSA R	210	2.66	6.76	35	16.3	4
MIDDLE FORK BROAD RVR 28	2	0.9	BROAD R, MIDDLE FK	50	2.45	12.89	30	14.6	10
MIDDLE FORK BROAD RVR 30	2	0.6	BROAD R, MIDDLE FK	52	2.15	1.31	10	5	3
MIDDLE OCONEE-WALNUT CR 06	2	1.7	M OCONEE R	49	2.53	3.58	20	8.9	5
NORTH BROAD RVR 32	2	1.2	BROAD R, N FK	57	1.90	1.6	12	5.9	3
NORTH BROAD RVR 33	2	0.8	BROAD R, N FK	66	2.83	0.06	2	0.42	1
POTATO CR 82	5	1.9	POTATO CR	52	4.88	11.31	15	4.2	13*
PUMPKINVINE CR 02	4	1.6	ETOWAH R	1282	4.20	2.34	20	8.6	2
PUMPKINVINE CR 11	4	2.0	PUMPKINVINE CR	48	3.71	0.65	5	2.15	2
PUMPKINVINE CR 16	4	1.0	PUMPKINVINE CR	81	2.89	7.85	25	11.5	5
RACCOON CR 07	4	1.3	RACCOON CR	51	3.62	4.44	20	7.8	4
RACCOON CR 08	4	1.0	ETOWAH R	1284	1.38	3.2	20	9.5	4
SALLACOA CR 062	3	0.4	SALACOA CR	85	3.53	0.01	0.5	0.05	1
SAUTEE CR 13	1	2.0	CHATTAHOOCHEE R	107	2.95	3.42	30	16.2	2
UPPER MULBERRY R 08	2	2.0	MULBERRY CR	51	2.84	2.63	20	8.4	3

*1999-present is current drought of record for this reservoir; yield may ultimately be lower than shown.

ENVIRONMENTAL FACTORS

Environmental factors were selected based on the impact they would have on the expanded reservoir permitting process:

- Streams
- Wetlands
- Impaired Streams
- Trout Streams
- Threatened and Endangered Species
- Cultural Resources
- Historic Resources

These factors were deemed to have a significant impact, and in some cases, an absolute barrier to permitting, were gathered from readily available sources. In most cases, these factors were already in a GIS based coverage that could be readily overlaid to the expanded reservoir footprints. There were several factors for which GIS coverages were created out of non-GIS readily available sources. The following describes each of the environmental factors used in the reservoir selection process and their sources. The sources are administered entirely by various State of Georgia sponsored agencies.

<u>Stream Impacts</u>

The Georgia GIS Clearinghouse (http://www.gis.state.ga.us/) contains stream coverages developed from the latest United States Geological Survey (USGS) 7.5 minute quadrangles. The coverages are specific to each Georgia county and represent both the perennial and intermittent "blue-line" streams shown on the quadrangle maps. The streams from each county that contained at least one of the 166 reservoir locations were downloaded from the Clearinghouse. Stream impacts were measured based on the number of linear feet of stream within the expanded reservoir footprint.

Figure 6 - Example, Stream Impacts

Wetland Impacts

The Georgia GIS Clearinghouse contains wetland coverages for the entire State developed from the National Wetland Inventory (NWI) digital data files. These files are records of wetlands locations and classifications as developed by the U.S. Fish & Wildlife Service. The files are both linear, representing streams, and polygonal, representing wetland areas and other jurisdictional features, such as ponds. It was discovered early in the collection process that the NWI streams were not as comprehensive as the USGS quadrangle streams also from the Clearinghouse. Therefore, the linear NWI coverages were not used in assessing the stream impacts; the U.S.G.S. streams were used for this purpose. However, the polygonal coverages were used to assess wetland and associated jurisdictional impacts.

The polygonal features were separated into two categories, palustrine (wetlands, marshes, etc.) and lacustrine (ponds and lakes). It was opined during project team discussions that palustrine impacts would be a more critical factor so separating into two categories would allow application of more weight to the palustrine impacts.

Wetland impacts were measured based on the amount of acres within the expanded reservoir footprint.

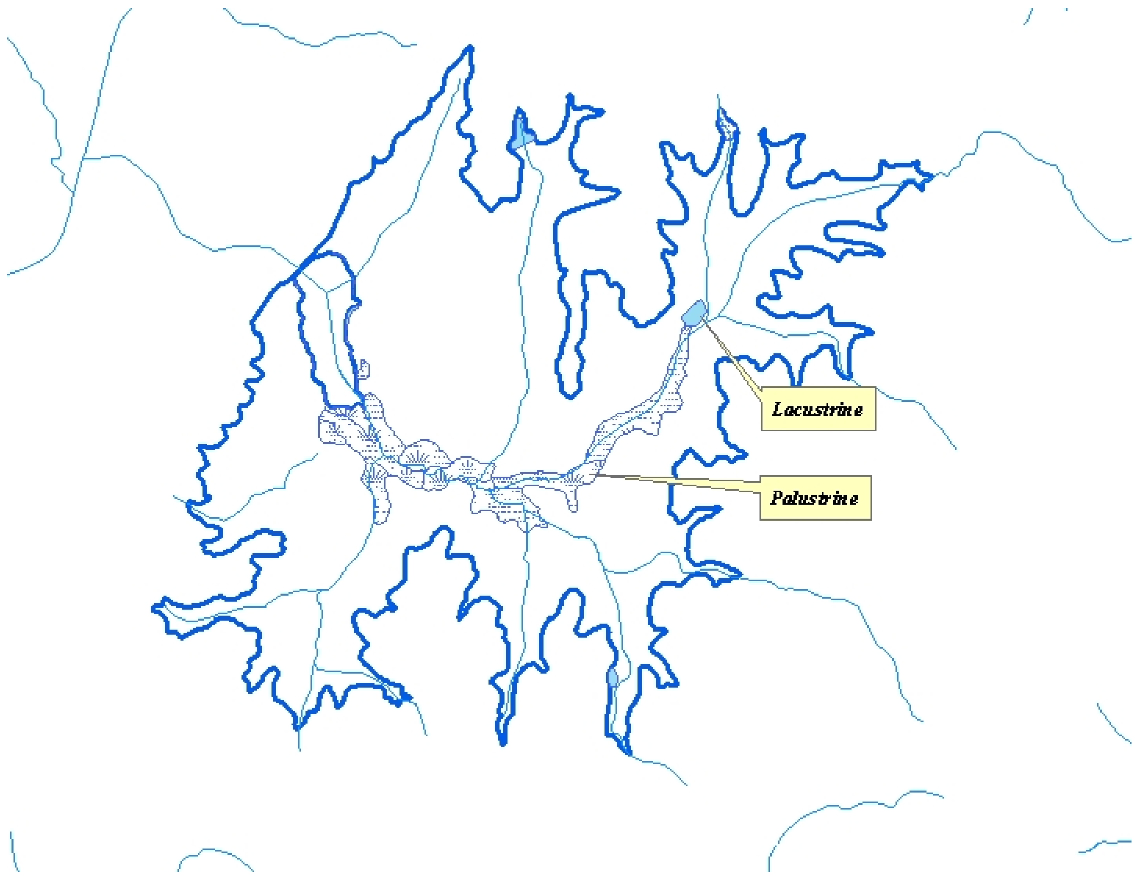


Figure 7 - Example, Wetland Impacts

Impaired Streams

The Georgia Environmental Protection Division (EPD) of the Georgia Department of Natural Resources (DNR) has responsibility for maintaining a list of water quality impaired streams in the State, the 303(d) list (http://www.gaepd.org/Documents/305b.html). This list is updated every two years, with 2002 being the first year the list was formulated. The list was updated in 2004 and 2006. Only the 2002 list has been placed by EPD into a GIS coverage. This 2002 list coverage was downloaded along with the table listings for 2004 and 2006. The 2002 GIS coverage was manually adjusted using the 2004 table listings to formulate a GIS coverage for the 2004 list. This 2004 GIS coverage was then manually adjusted using the 2004 table listings to formulate a 2006 GIS coverage. The 2006 GIS coverage was then used to determine listed streams that would be impacted by the expanded reservoirs.

Impaired stream impacts were measured based on the number of linear feet of impaired stream within the expanded reservoir footprint.

Figure 8 - Example, Impaired Stream

Trout Streams

The Georgia DNR maintains maps in a PDF format on their website (http://georgiawildlife.dnr.state.ga.us/content/displaycontent.asp?txtDocument=34). These maps are specific to Georgia counties containing trout streams. It was surmised by examining the maps that they were created using a GIS and therefore the trout stream GIS coverage might be available. Attempts to contact DNR personnel knowledgeable with respect to the GIS trout stream coverage were successful. An electronic copy of the GIS coverage was received and used to assess impacts to trout streams from the expanded reservoir footprints.

Impacts were classified as to whether it was a primary or secondary trout stream, as defined in the DNR geo-database. Trout stream impacts were measured based on the number of linear feet of trout stream within the expanded reservoir footprint.

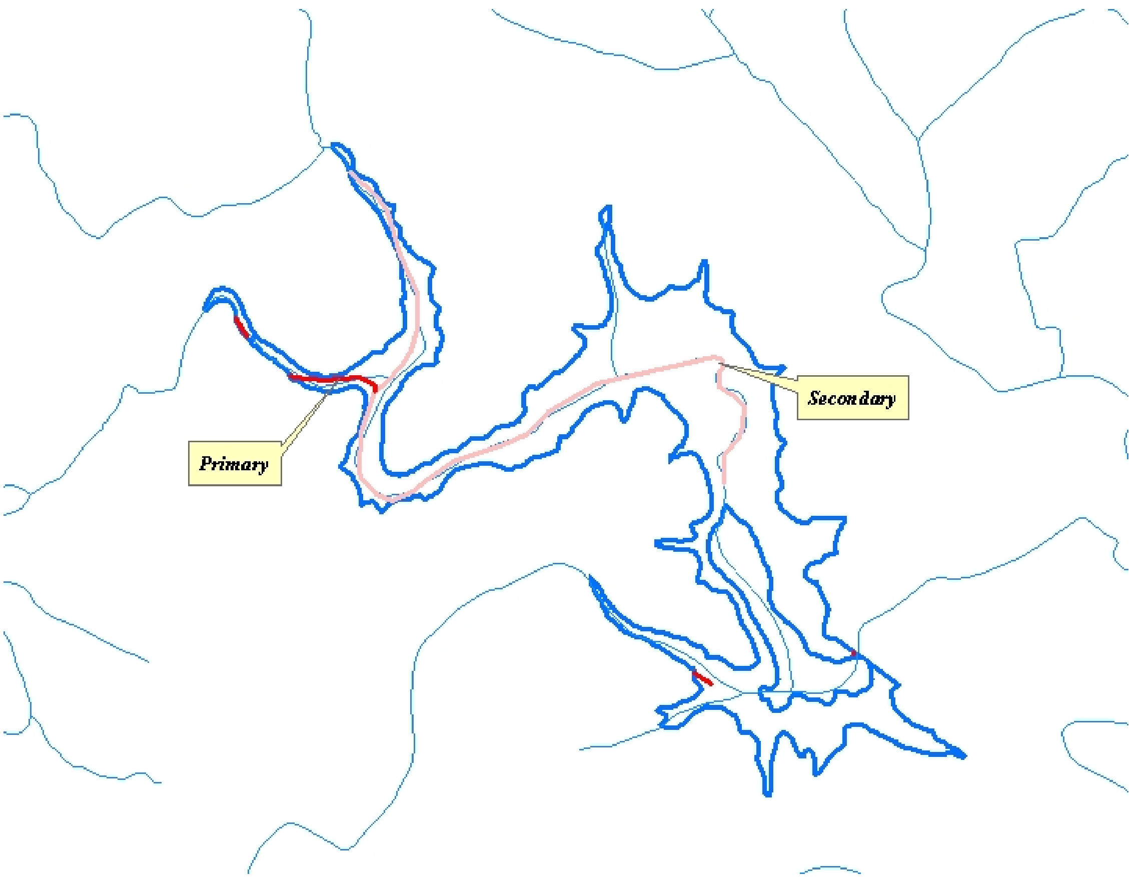


Figure 9 - Example, Trout Stream Impact

Threatened and Endangered Species

The Clearinghouse maintains a State-Wide GIS coverage of threatened and endangered species. The coverage is not a geo-database that contains locations of specific known occurrences. It is, rather, data that is attached to the 3.75 minute quarter-quad grid for the State of Georgia. The potential threatened and endangered species that may be encountered within the specific quarter-quad area are associated to the specific graphic grid shape.

Species were categorized as either flora or fauna as defined in the geo-database. It was opined during team discussions that flora would represent a lesser impact that fauna. Separating the two would allow different weight to be applied to either category. Threatened and endangered species impacts were measured based on the number of potential occurrences in the quarter-quad area within which the expanded reservoir footprint is found.

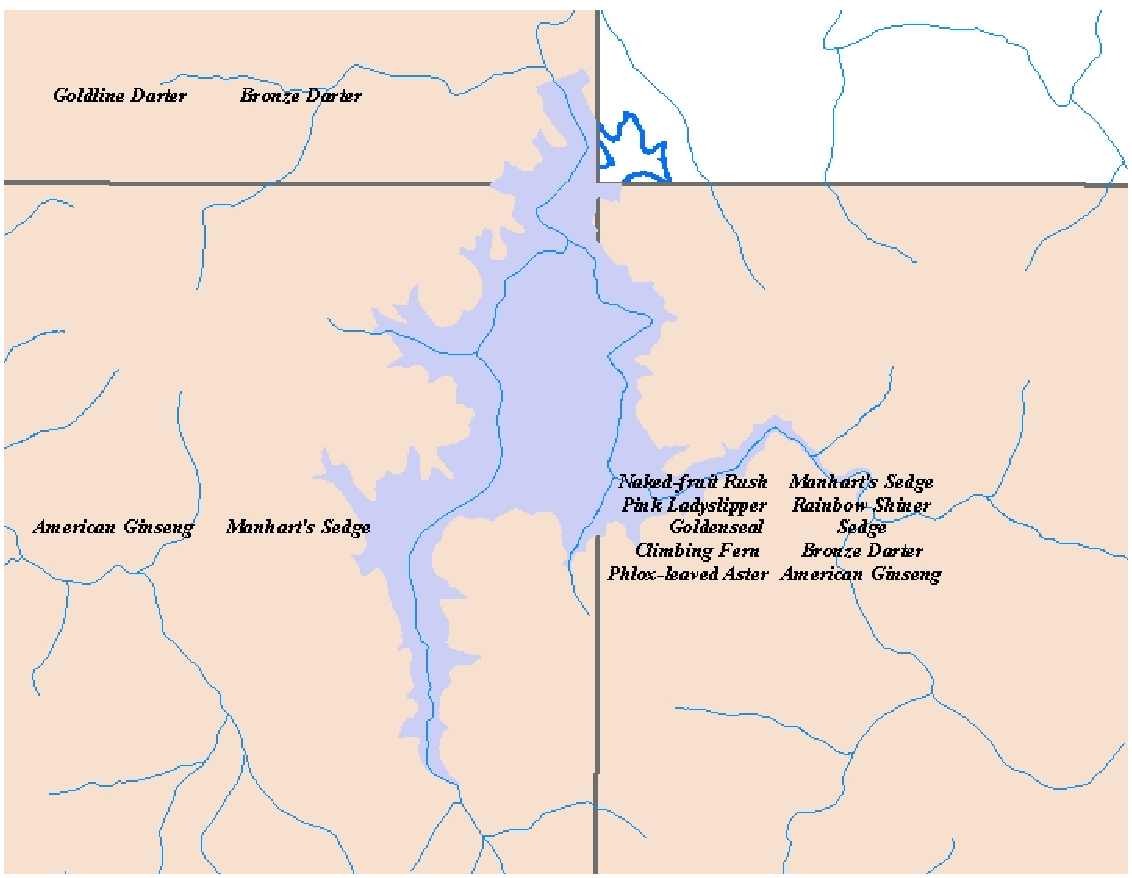


Figure 10 - Example, Threatened and Endangered Species

Cultural Resources

The Clearinghouse has GIS coverages specific to each Georgia county that contains point locations of named features located throughout Georgia. This data is an extract from the Geographic Names Information System (GNIS) compiled by the USGS. The information has been typically used in emergency preparedness, marketing, site-selection and analysis, genealogical and historical research, and transportation routing applications. It therefore has an excellent capacity for application as an environmental factor in reservoir selection. Cultural resources consist of things such as airports, schools, churches, cemeteries, etc.

Cultural resource impacts were measured by the number found within the expanded footprint of the reservoir.

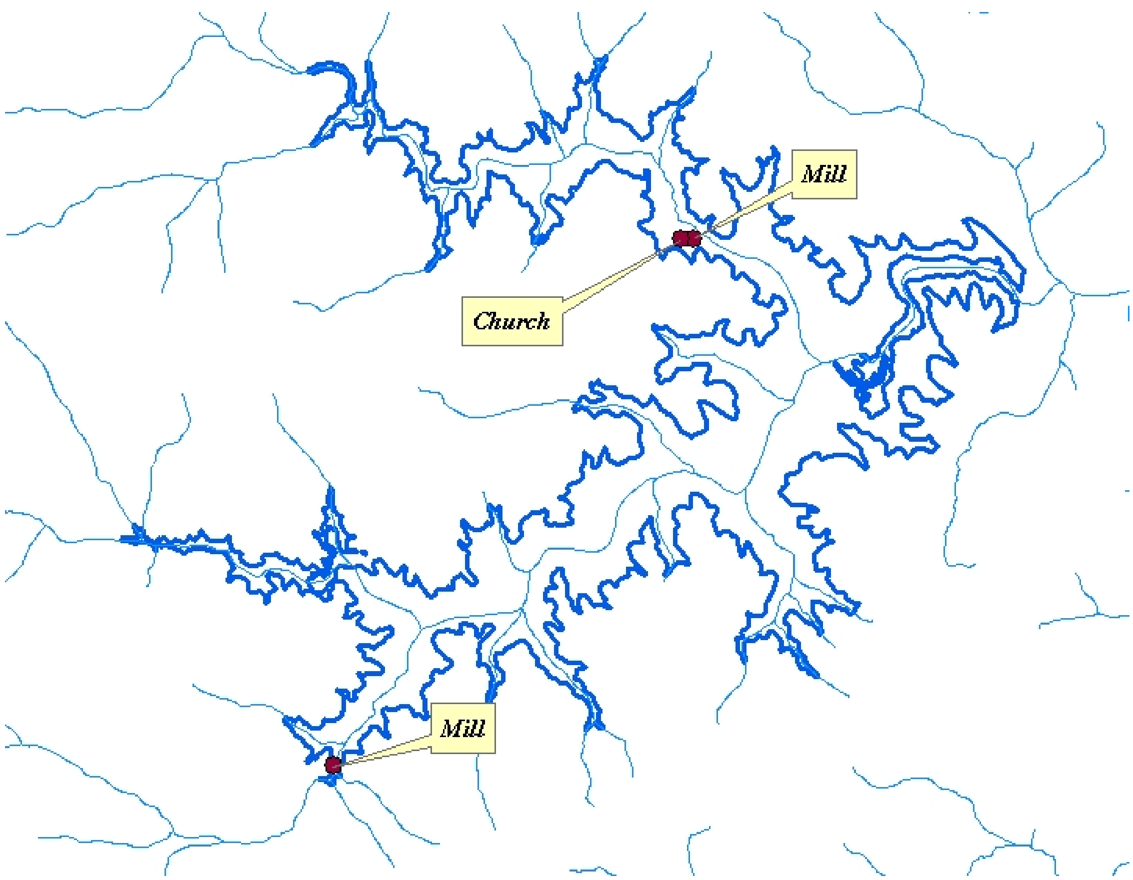


Figure 11 - Example, Cultural Resources Impacts

Historic Resources

Georgia's Natural, Archaeological, and Historic Resources GIS (NAHRGIS) is a geographical information system designed to catalog information about the natural, archaeological, and historic resources of Georgia (https://www.itos.uga.edu/nahrgis/). In its current, initial phase of development, NAHRGIS contains information about Georgia's archaeological and historic resources. Historic resources include buildings, structures, historic sites, landscapes, and districts included in the Historic Preservation Division's Historic Resources Survey or listed in the National Register of Historic Places. This information has been compiled by the Historic Preservation Division of the Department of Natural Resources-Georgia's state historic preservation office-in collaboration with the Georgia Archaeological Site File at the University of Georgia. The historic resource GIS coverage was downloaded and overlaid to the expanded reservoir footprints. Archaeological site locations were requested but they have not been provided without explanation.

Historic resources were measured based on the number of sites found within each expanded reservoir footprint.

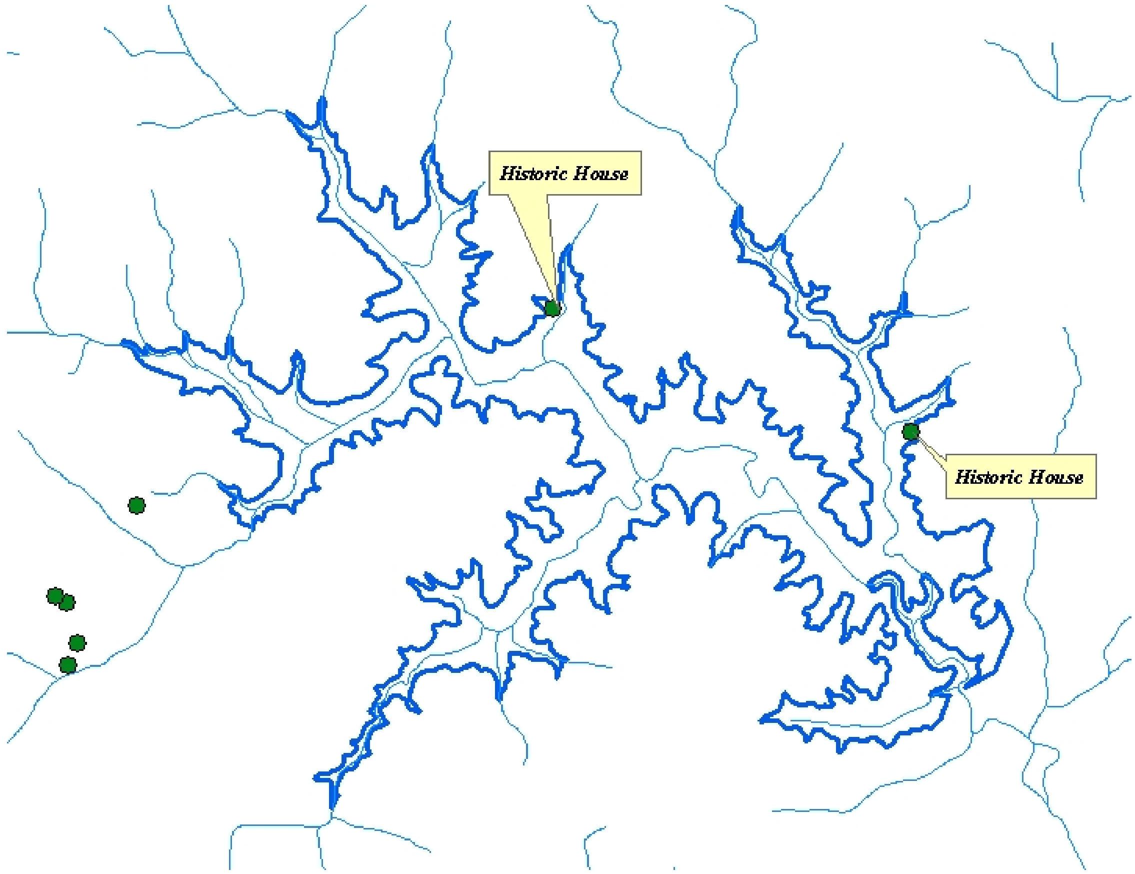


Figure 12 - Example, Historic Resources

DEVELOPMENT OF GIS DATABASE

The GIS database was developed using the maps and aerial photographs described previously in the Evaluation Factors/Methodology section. The database contains the original maps and aerial photographs obtained by the methods described, and the extracted information related to each specific reservoir.

The first step in the process was to eliminate the area of the existing NRCS project. The environmental, historical, and cultural impacts were calculated for that portion of the proposed reservoir between the existing NRCS project limits and the proposed top of dam. The elimination of the existing NRCS project limits from the GIS model improved the study team ability to compute the appropriate impacts for each project.

The second step involved the extraction of the environmental factors that were found within the expanded pool of each reservoir. The extraction was accomplished so that the Dam Name would be associated with reservoir specific factors. By associating the Dam Name with reservoir specific factors, the summing of factors was facilitated for each reservoir. This second step created a “one-to-many” coverage with many database entries associated with one reservoir. For example, several USGS stream reaches were associated with one dam. The “one-to-many” format was created in the second step for the environmental factors. Since the summing of the factors was accomplished in a spreadsheet environment, a third step was necessary to “dissolve” specific reservoir factors for each environmental category into one database entry for each reservoir.

The third step “dissolves” the numerous environmental factor database entries for each reservoir into one entry for each environmental category. The description of individual impacts was lost in this third step. However, the “multi-part” nature of the dissolve means that the graphic representations are found in one database entry, thus facilitating a calculation of the length, area, or number of each environmental impact for each reservoir. The databases created from this third step were imported directly into the spreadsheet environmental for comparison of the impacts between the 166 reservoirs.

The full GIS database is provided on the Digital Video Disc (DVD) attached to this document. The database consists of shape files that have been created in ArcGIS 9.1. An electronic data dictionary that describes the shape files and their database field structure is included on the DVD. The shape file format allows viewing of the GIS data using ArcGIS, ArcView, or ArcExplorer. Editing of the data can also be accomplished using ArcGIS or ArcView. ArcExplorer, which is free and may be download from various sources on the internet, will only allow viewing of the data. ArcGIS and ArcView are ESRI proprietary softwares that will need to be purchased for use.

DECISION MATRIX SPREADSHEET

Upon development of the GIS database, the sums of the various environmental and engineering impacts from the 166 dams were imported into a spreadsheet for evaluation. The spreadsheet was formatted as a decision matrix so that rankings could be developed to facilitate selection of the final 20 dams. The decision matrix consisted of three ranking procedures, each independent of the other so that comparison of the methods could be made. Each ranking procedure also included two iterations, one ranking with no pump-storage facilities and one ranking that included all pump-storage facilities. Within each procedure, the individual factors were ranked. The sums of these individual rankings were used to extract the dams with highest overall rank. Note that ranking matrix 1 only summed the raw values from each individual category. From these top ranked dams, the final 20 dams were selected. The developed spreadsheet, without weighting values, is included on the attached CD. This is so any individual examining this report and documentation may use the spreadsheet to come to an independent conclusion concerning the most feasible dams for water supply.

The following is the list of each ranking category and its raw ranking unit:

1. Environmental
    - Cultural Resources – Number of sites impacted
    - Historic Resources – Number of sites impacted
    - Trout Streams – Linear feet impacted
    - USGS Streams – Linear feet impacted
    - Impaired Streams – Linear feet impacted
    - Lacustrine Wetlands – Acres impacted

- Palustrine Wetlands – Acres impacted
- Threatened and Endangered Species – Number of fauna impacted
- Threatened and Endangered Species – Number of flora impacted
- Threatened and Endangered Species – Number of natural communities impacted

2. Economic
    - Streets – Number of streets impacted
    - Structures – Number of structures impacted

3. Engineering
    - Approximate Yield – In MGD
    - Reservoir Fill Time – In years
    - Pumping Distance – In miles, for pump-storage facilities only, non-pump storage facilities were automatically given a default advantage with a distance of zero.
    - Surface Water Intakes – Linear feet to nearest downstream intake

Figure 13 in the Appendix shows a sample of the decision matrix spreadsheet. The DVD in the Appendix contains all the GIS study data.

Ranking Matrix 1

The initial ranking matrix consisted of the raw values of environmental and engineering factors without regard to the relative magnitude of each category. For example, the number of cultural resources impacted by an expanded reservoir would be typically less than 10, while the distance to the nearest downstream intake would be in thousands of feet. This automatically placed more weight on those values with higher relative magnitudes of values. To help work around this phenomena, a weighting factor was included for each category so that some normalization could occur between factors without regard to the relative magnitude of each. It was realized, however, that this weighting factor was serving both for normalization and weighting, which in reality needs to be two unique values.

The ranking was formulated simply by adding the raw values including any weights given to specific categories. It was realized that this was a cumbersome process with a wide fluctuation in weighting factors to normalize the data. It was retained in the decision matrix simply as comparison to the other two ranking matrices.

Ranking Matrix 2

Ranking matrix 2 separated the normalization and weighting factor into two unique factors. The normalization factor was simply the ratio of the number of values (166 for the non-pump-storage list, 195 for the pump-storage list) in each category to the maximum value in each category. The rankings for each category were conducted on the normalized values. This meant that each category would have rankings reflective of a spread from either 1 to 166 or 1 to 195, depending on which list was examined. Without this, the ranking spread would be inconsistent between categories. For example, only 18 dams had cultural resource impacts; without the normalization factor the ranking spread would be from 1 to 18. This would produce the same problem found in ranking matrix 1, with the higher relative magnitude factors controlling the rankings. By taking the highest cultural resource value of 9 and dividing it into either 166 or 195, the ranking spread would be from either 1 to 166 or 1 to 195. Doing this with each ranking category produces the same relative magnitude of ranking values.

This simplified the weighting values since no more than a two digit integer would be required for any weighting value. If any category was believed to be say, twice as important as the others, it could be given a weight of two. By the same token, if a category was deemed 10 times more important than the others, it could be given a weight of 10.

Ranking Matrix 3

The only difference between ranking matrices 2 and 3 was the normalization factor. Instead of using a ranking spread of either 1 to 166 or 1 to 195, the ranking spread was normalized to 0 to 1. This was accomplished by dividing each value in the category by the highest value in the category such that each ranking value is a fractional value of the highest value in the specific category. This also allows a simplified weighting factor in the same way as ranking matrix 2.

SELECTION CRITERIA FOR TOP 20 DAMS

The GIS database allowed the study team to evaluate the scoring weight of the previously discussed parameters in the selection matrix. In the final analysis, after evaluating how the ranking values could be normalized and what range of weights were appropriate for each category, the project team, along with the GSWCC and NRCS decided to place yield potential as the first priority and time to refill as the second priority. In effect, the various weighting schemes identified above were not used in the final selection process. The project team concluded that the projects selected for further evaluation should have a safe yield of at least 1 mgd and a refill time not exceeding five years.

The process followed to arrive at the twenty dams was as follows. The 166 dams were sorted based on descending yields with refill times equal to or less than five years. This approach produced 37 dams, several of which met the requirements discussed above both for on-stream and pump storage. Table 5 shows the 37 dams and indicates why 17 of the dams were eliminated. After reviewing the geographic location of these dams in relation to demand and need for waer and if the reservoirs were on primary trout streams, a list of twenty dams was developed. Three of these dams, South River 27, South River 29, and Middle Fork Broad River 28 did have refill times over five years but had good safe yields. The decision was made to reduce the height of these dams such that the refill times were no greater than 5 years. New safe yields values were calculated to insure the 1 mgd limit was met. North Broad River 32P and Sautee Creek 13P were selected as alternates in case any of these three dams could not be modified to achieve the minimum criteria. The alternates were not used. In addition, Little Tallapoosa River structure 20 had close to 200 structures impacted with the original proposed new top of dam elevation. The study team made the decision to lower the proposed dam forty feet so that the number of impacted structures was less than 20. The safe yield was recalculated at approximately 0.9 mgd. Table 6 list the final selected 20 dams. Figure 14 shows the final 20 dam locations.

TABLE 5

DAM (P refers to pump storage)	COUNTY	Selection/Elimination Criteria
Beaverdam Creek 30	Ebert	N
Cartecay River 01	Gilmer	P
Cartecay River 01 P	Gilmer	S
Cartecay River 03	Gilmer	T
Cartecay River 03 P	Gilmer	T
Cartecay River 08	Gilmer	T
Cartecay River 10 P	Gilmer	T
Ellijay River 01 P	Gilmer	S
Ellijay River 04	Gilmer	T
Etowah River 01 P	Forsyth	S
Etowah River 09 P	Dawson	C
Etowah River 10 P	Dawson	S
Etowah River 12	Dawson	C
Etowah River 12 P	Dawson	C
Etowah 13 P	Dawson	C
Etowah River 26	Lumpkin	T
Etowah River 26 P	Lumpkin	T
Etowah River 32	Lumpkin	T
Little Tallapoosa River 16	Carroll	Y
Little Tallapoosa River 19 P	Carroll	S
Little Tallapoosa River20 P	Carroll	S
Lower Little Tallapoosa River 14 P	Carroll	S
Lower Little Tallapoosa River 19 P	Carroll	S
Middle Fork Broad 44	Habersham	S
Middle Fork Broad River 28 P	Franklin	S
Middle Fork Broad River 30 P	Franklin	S
Middle Oconee-Walnut Creek 06P	Jackson	S
Mountaintown Creek 01	Gilmer	T
Mountaintown Creek 02	Gilmer	T
North Broad River 32 P	Franklin	A
Pumpkinvine Creek 02 P	Bartow	S
Pumpkinvine Creek 11 P	Paulding	P
Pumpkinvine Creek 16 P	Paulding	P
Raccoon Creek 07 P	Bartow	S
Raccoon Creek 08 P	Bartow	S
Sautee Creek 13 P	White	T/A
South River 27	Madison	S
South River 29	Madison	S
Talking Rock Creek 02	Pickens	S
Talking Rock Creek 13	Pickens	S
Upper Mulberry River 08 P	Hall	S

Key:
S – Selected
N – No High Demand for Water
T – Located on primary Trout Stream
C – New Project already under development
A – Alternate to top 20 dams
P – Potential Permit Issues
Y – Low Yield Among Adjacent Projects

TABLE 6

	County	Safe Yield (mgd)	Refill Time (years)	Estimated Cost
Lower Little Tallapoosa 14 P*	Carroll	7.5	4-5	$112,000,000
Lower Little Tallapoosa 19 P	Carroll	9.9	4-5	$115,000,000
Little Tallapoosa 20 P	Carroll	0.9	0.8	$71,000,000
Little Tallapoosa 19 P	Carroll	5.5	4-5	$212,000,000
Raccoon Creek 7 P	Bartow	4.1	4-5	$96,000,000
Raccoon Creek 8 P	Bartow	11.5	4-5	$91,000,000
Pumpkinvine Creek 2 P	Bartow	6.8	4-5	$78,000,000
Ellijay River 1 P	Gilmer	9.6	2	$118,000,000
Cartecay River 1 P	Gilmer	8.6	2	$79,000,000
Talking Rock Creek 2	Pickens	1.0	4	$48,000,000
Talking Rock Creek 13	Pickens	2.3	5	$73,000,000
Etowah River 10 P	Dawson	17.8	4-5	$153,000,000
Etowah River 1 P	Forsyth	24.3	4-5	$256,000,000
Upper Mulberry River 8 P	Hall	2.6	4-5	$113,000,000
Middle Oconee – Walnut Creek 6 P	Jackson	3.0	4-5	$79,000,000
Middle Fork Broad River 28 P	Banks	8.0	4-5	$101,000,000
Middle Fork Broad River 44	Habersham	1.5	2	$59,000,000
Middle Fork Broad River 30 P	Banks	3.5	4-5	$57,000,000
South River No.27	Madison	3.9	5.5	$191,000,000
South River No.29	Madison	5.7	5.5	$243,000,000

* P denotes pump diversion

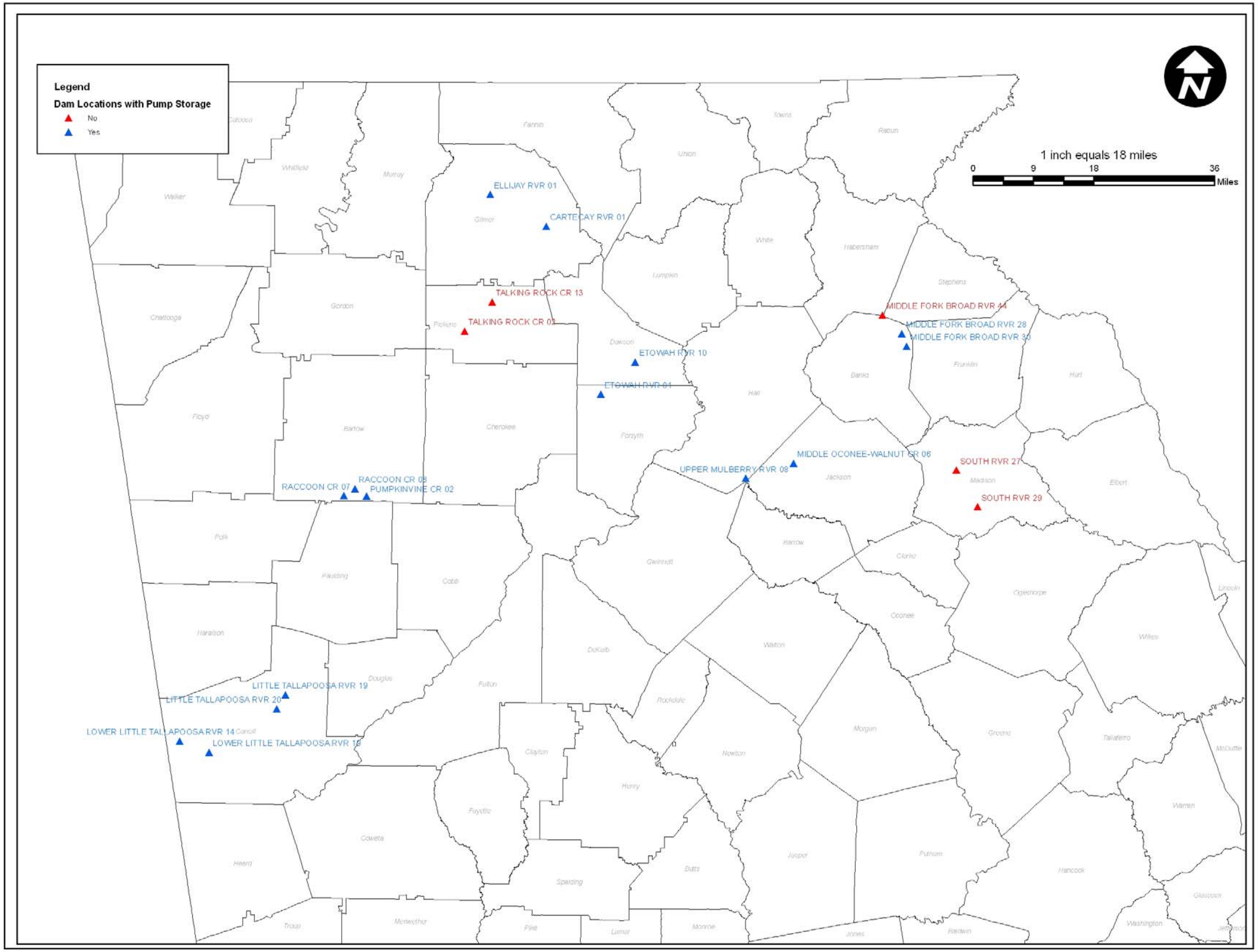


Figure 14
Location of Final Twenty Dams

APPENDIX

Weighting Coefficients

Dam Name	Cultural Resource	Historic Structures	Trout Streams	USGS Streams	Impaired Streams	Open-Water Wetland Areas	Other Wetland Areas	Surface Water Intake Locations	Endangered Species:FAUNA	Endangered Species:FLORA	Endangered Species:NATURAL COMMUNITIES	Streets	Structures	Approx. Safe Yield	Fill Time	Notes	Weighted Sum
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		
	(# of pts impacted)	(# of pts impacted)	(ft)	(ft)	(ft)	(acres)	(acres)	(ft)	(# of pts impacted)	(# of pts impacted)	(# of pts impacted)	(# of pts impacted)	(# of pts impacted)	(MGD)	(yr)		
Amicalola Creek 02	0	0	11725.14	14206.06	0.00	0.00	2.69	238846.58	6	3	0	2	6	-2.10	7.00		264802.38
Amicalola Creek 03	0	0	14686.02	23182.59	12078.40	0.00	3.96	241493.92	7	6	0	9	13	-4.20	13.00	C	291488.69
Amicalola Creek 04	0	0	7184.92	7983.98	0.00	0.00	6.08	233998.04	6	3	0	5	8	-1.80	7.00		249200.22
Barber Creek 06	1	0	0.00	67893.62	0.00	2.59	76.75	0.00	0	0	0	17	173	0.00	66.00		68229.96
Barber Creek 26	0	0	0.00	15851.98	0.00	0.00	14.36	259596.26	1	0	0	5	6	-0.20	15.00	F	275489.40
Beaverdam Creek 04	0	0	0.00	4842.19	0.00	0.00	7.13	127857.70	0	0	0	3	10	0.00	66.00	N	132786.02
Beaverdam Creek 05	0	0	0.00	7977.48	0.00	0.00	13.21	121894.69	0	0	0	7	20	0.00	66.00	N	129978.38
Beaverdam Creek 06	0	0	0.00	1415.88	0.00	0.00	9.03	117392.51	0	0	0	0	0	0.00	66.00	N	118883.42
Beaverdam Creek 08	0	0	0.00	31876.70	0.00	1.80	28.73	129206.60	0	0	0	13	54	0.00	66.00	N	161246.83
Beaverdam Creek 17	0	0	0.00	34506.32	0.00	6.00	48.18	99212.14	0	0	0	12	48	-1.40	15.00	F	133846.24
Beaverdam Creek 30	0	0	0.00	76414.97	0.00	6.14	77.46	48190.51	0	1	0	13	24	-8.60	10.00		124728.48
Big Cedar Creek 32	0	0	0.00	23657.45	0.00	0.00	25.01	1033112.39	1	2	0	5	0	-1.00	11.00	C	1056812.84
Bishop Creek 07	0	0	0.00	15114.94	0.00	7.14	108.14	1033112.39	0	2	0	9	59	0.00	66.00		1048478.61
Cartecay River 01	0	0	13285.98	16343.59	0.00	0.00	4.14	101551.69	2	10	1	8	18	-3.15	5.00		131226.26
Cartecay River 03	0	3	10296.82	11991.89	0.00	0.00	1.45	108222.43	2	3	0	14	19	-1.75	5.00		130556.84
Cartecay River 05	0	2	11985.52	12533.69	0.00	0.00	4.09	121366.15	0	0	0	31	27	-2.30	9.00	C	145956.14
Cartecay River 06	0	0	7561.28	10476.58	0.00	0.00	0.47	160838.73	1	4	0	12	9	-0.40	35.00	F, C	178937.66
Cartecay River 07	0	0	11883.99	13609.05	0.00	0.00	0.76	170052.60	3	8	0	1	1	-0.60	39.00	F, C	195597.79
Cartecay River 08	0	1	21610.80	26416.36	0.00	0.00	4.16	132149.67	3	8	0	7	15	-8.40	9.00	C	180215.59
Cartecay River 10	0	0	6944.82	8508.50	0.00	0.00	12.73	78293.29	2	2	0	1	1	-0.70	1.00		93765.64
Ellijay River 01	0	2	21729.27	40314.98	0.00	0.00	8.26	33302.22	7	0	0	20	27	-3.40	6.00		95413.34
Ellijay River 03	0	0	6510.15	9587.47	0.00	0.00	3.01	75029.71	2	0	0	1	0	-1.50	7.00		91138.84
Ellijay River 04	0	5	23367.45	31998.85	0.00	0.00	5.07	65843.44	5	3	0	20	27	-5.20	9.00	C	121278.61
Ellijay River 09	0	0	13118.92	19411.43	0.00	0.00	0.52	84602.88	6	3	0	14	23	-2.70	6.00		117183.05
Ellijay River 10	0	0	4680.16	10725.00	0.00	2.68	6.28	73062.97	5	0	0	5	0	-0.40	1.00		88487.69
Ellijay River 11	0	0	2275.30	3837.81	0.00	0.00	1.48	98376.39	4	3	0	10	2	-0.54	7.00		104516.45
Ellijay River 12	0	0	3179.86	9718.86	0.00	0.00	0.60	96747.38	3	3	0	6	3	-0.70	6.00		109667.00
Etowah River 01	0	0	0.00	42352.89	0.00	6.64	23.17	88225.00	4	1	0	10	83	-4.80	27.00		130727.89
Etowah River 09	0	0	0.00	5136.97	0.00	0.00	20.96	176474.07	5	1	0	1	7	-0.50	5.00		181650.50
Etowah River 10	0	0	0.00	26250.95	0.00	0.00	2.84	176366.64	3	1	0	27	10	-0.40	34.00	F, C	202695.03
Etowah River 12	0	0	0.00	17987.73	0.00	0.00	3.64	7945.37	3	1	0	1	1	-1.14	5.00		25946.60
Etowah River 13	0	0	0.00	21362.42	0.00	0.00	4.30	17268.19	8	1	0	8	2	-1.90	36.00	C	38688.01
Etowah River 25	0	0	15254.34	21803.42	0.00	0.00	5.34	128270.21	7	1	0	3	6	-2.00	39.00	C	165387.31
Etowah River 26	0	0	1445.44	17294.49	7380.49	2.22	2.25	103618.50	6	1	0	3	1	-2.85	3.00		129754.54
Etowah River 32	0	0	21109.52	26897.90	0.00	0.00	5.10	158581.32	1	1	0	2	0	-5.10	9.00	C	206601.74
Euharlee Creek 49	0	0	0.00	5153.20	0.00	0.00	2.63	29004.47	4	0	1	0	0	-0.35	4.00		34168.95
Euharlee Creek 51	0	0	0.00	7009.53	0.00	0.00	4.74	40933.77	5	0	1	0	0	-0.23	11.00	C	47964.81
Euharlee Creek 76	0	0	0.00	3595.90	0.00	0.00	4.73	39140.50	0	0	0	2	0	-0.21	1.00		42743.92
Grove River 21	0	0	0.00	4571.21	0.00	0.00	13.90	39601.55	0	0	0	0	0	-0.03	15.00	F	44201.64
Grove River 25	0	0	0.00	12730.84	0.00	0.00	3.42	28454.01	0	0	0	3	13	0.00	66.00	N	41270.28
Grove River 33	0	0	0.00	18603.45	0.00	0.00	56.26	17433.27	0	0	0	4	34	0.00	66.00	N	36196.98
Grove River 59	0	0	0.00	55498.19	0.00	1.45	37.49	62078.17	0	0	0	15	28	-3.50	13.00	F	117667.81
Hazel Creek 12	1	0	0.00	2392.22	0.00	0.00	1.50	494585.88	0	0	0	2	0	-0.12	1.00		496983.48
Hazel Creek 19	0	1	0.00	14395.60	0.00	0.00	10.12	490227.96	0	0	0	0	0	-0.62	7.00		504641.06
Hazel Creek 21	0	1	0.00	16674.65	0.00	0.00	12.99	491040.02	2	0	0	10	41	-1.30	40.00	C	507820.36
Hightower Creek 25	0	0	7072.23	8823.96	0.00	0.00	1.85	61395.66	3	2	0	3	3	0.00	66.00	N	77370.69
Little River 07	0	0	0.00	27457.09	0.00	1.88	44.44	164141.89	0	0	0	8	8	-0.50	27.00	F, C	191687.81
Little River 15	0	0	0.00	12564.98	0.00	0.00	16.71	436471.73	0	0	0	6	72	-0.30	13.00	C	449144.13
Little River 17	0	0	0.00	4881.34	0.00	0.00	4.87	443524.86	0	0	0	4	15	-0.37	9.00	C	448438.71
Little River 19	0	0	0.00	4630.42	0.00	0.00	4.39	452165.86	0	0	0	3	7	-0.40	11.00		456821.26
Little River 21	0	1	0.00	12948.40	0.00	0.00	14.09	457138.81	1	0	0	3	10	-0.80	2.00		470117.50
Little River 25	0	1	0.00	46517.26	0.00	2.65	63.40	447682.97	1	0	0	25	151	-4.40	11.00	C	494450.88
Little River 27	0	0	0.00	16607.71	0.00	0.00	15.50	463247.72	1	0	0	7	25	-1.30	11.00	C	479913.64
Little River 31	0	0	0.00	5070.36	0.00	0.00	16.03	444407.90	1	0	0	3	13	-0.57	4.00		449514.72
Little River 36	0	2	0.00	16285.12	0.00	1.71	18.61	438474.75	0	0	0	11	59	-1.20	9.00	C	454860.00
Little Sandy-Trail Creek 06	0	0	0.00	21963.60	0.00	0.00	22.33	49914.62	0	0	0	1	3	0.00	66.00	N	71970.55
Little Satilla Creek 07	1	0	0.00	20842.55	18348.01	38.21	444.26	1033112.39	1	0	0	13	0	0.00	66.00		1072866.42
Little Tallapoosa River 06	0	0	0.00	17120.73	0.00	0.00	12.84	37002.25	7	0	0	3	1	-0.65	5.00		54151.17
Little Tallapoosa River 16	0	0	0.00	32346.72	0.00	1.31	102.63	57196.56	0	0	0	9	15	-2.20	5.00		89674.02
Little Tallapoosa River 19	1	0	0.00	73348.03	0.00	2.98	199.38	38067.39	5	0	0	14	78	-3.30	23.00	C	111735.49
Little Tallapoosa River 20	0	0	0.00	47917.98	0.00	0.99	81.33	26905.88	5	0	0	25	198	-1.30	27.00	F, C	75159.87
Little Tallapoosa River 21	0	0	0.00	19063.51	0.00	0.00	14.26	19828.62	0	0	0	11	47	-0.90	15.00	C	38978.50
Little Tallapoosa River 30	1	0	0.00	74516.16	0.00	4.22	113.72	76338.19	0	0	0	14	118	-2.60	27.00	F, C	151129.69
Little Tallapoosa River 51	0	0	0.00	40656.31	0.00	0.00	0.00	1033112.39	0	0	0	8	49	-1.90	22.00	C	1073845.80
Long Swamp Creek 14	0	0	22682.62	40011.85	0.00	0.00	1.67	109387.74	6	2	0	14	37	-7.60	34.00	C	172169.27
Lower Little Tallapoosa River 14	1	0	0.00	28379.53	0.00	4.71	29.20	1033112.39	0	0	0	2	18	-1.00	27.00	F, C	1061572.84
Lower Little Tallapoosa River 19	0	0	0.00	25939.68	0.00	0.00	6.30	1033112.39	0	0	0	4	20	0.00	66.00	N	1059148.37
Lower Little Tallapoosa River 25	0	0	0.00	42384.31	0.00	4.78	10.84	1033112.39	0	0	0	3	6	-0.40	27.00	F, C	1075547.91
Lower Little Tallapoosa River 35	1	0	0.00	48859.25	0.00	1.93	59.48	55882.21	5	2	0	7	17	-0.70	26.00	F, C	104860.17
Lower Little Tallapoosa River 74	0	0	0.00	22048.77	0.00	2.32	2.73	24178.88	6	2	0	2	4	0.00	66.00	N	46312.70
Lower Little Tallapoosa River 80	0	0	0.00	41034.80	0.00	6.73	14.44	29347.48	6	2	0	7	5	-2.65	23.00	C	70443.80
Lower Little Tallapoosa River 82	0	0	0.00	27664.08	0.00	0.00	25.04	1033112.39	4	0	0	9	120	0.00	66.00	N	1061000.51
Lower Little Tallapoosa River 93	1	0	0.00	40824.00	0.00	26.36	20.53	1033112.39	0	0	0	10	13	-0.30	27.00	F, C	1074033.98
Marbury Creek 22	0	0	0.00	24407.72	0.00	0.00	35.19	440260.99	0	2	0	7	49	0.00	66.00	N	464827.91
Middle Fork Broad River 06	0	0	0.00	10395.02	0.00	4.12	7.28	1033112.39	1	1	0	5	3	-2.30	1.00		1043527.51
Middle Fork Broad River 17	0	0	0.00	9330.84	0.00	0.00	2.63	1033112.39	1	2	0	4	2	-0.70	8.00	F	1042462.16
Middle Fork Broad River 28	0	0	0.00	27580.85	0.00	0.00	28.17	1033112.39	0	4	0	5	10	-0.75	16.00	N	1060755.66
Middle Fork Broad River 30	0	0	0.00	11248.15	0.00	0.00	19.00	1033112.39	0	1	0	1	7	0.00	66.00		1044454.54
Middle Fork Broad River 44	0	0	4452.24	7246.79	0.00	7.11	5.25	1033112.39	1	1	0	1	0	-0.53	10.00		1044836.24
Middle Oconee-Walnut Creek 01	0	0	0.00	60754.02	1583.65	0.00	22.43	254271.29	0	2	0	8	17	-0.70	14.00	F	316671.69
Middle Oconee-Walnut Creek 03	0	0	0.00	12831.07	0.00	0.00	6.50	240638.29	0	0	0	1	21	-0.35	15.00	F	253512.51
Middle Oconee-Walnut Creek 06	0	0	0.00	13086.62	0.00	0.00	12.69	160043.65	0	0	0	2	4	-0.35	15.00	F	173163.61
Middle Oconee-Walnut Creek 07	0	0	0.00	36004.86	6747.68	0.00	24.59	225079.65	0	0	0	3	4	-0.12	17.00	F	267880.66
Middle Oconee-Walnut Creek 12	0	0	0.00	33584.01	0.00	0.00	45.83	181633.53	0	0	0	5	13	-0.10	14.00	F	215295.28
Middle Oconee-Walnut Creek 18	0	2	0.00	24921.13	0.00	0.00	8.77	142004.76	0	0	0	5	53	-0.15	14.00	F	167008.51
Mill Creek 07	9	24	0.00	153764.06	0.00	4.87	63.94	41576.28	8	4	0	33	431	-1.30	13.00	F, C	195929.86
Mill Creek 08	1	1	0.00	27564.17	0.00	0.00	16.22	59465.67	3	4	0	6	78	-1.20	13.00	F, C	87150.87
Mill-Canton Creeks 04	1	0	0.00	23344.65	0.00	0.00	28.75	435927.95	1	0	0	29	219	-2.00	8.00	F, C	459557.35
Mill-Canton Creeks 07	1	0	0.00	24486.84	0.00	2.75	17.04	435979.65	1	0	0	3	42	-0.70	13.00	F, C	460545.58
Mountaintown Creek 01	0	0	16177.83	20433.66	0.00	0.00	1.18	288367.88	4	0	0	14	6	-2.95	5.00		325006.61
Mountaintown Creek 02	0	0	11700.76	14722.33	0.00	0.00	2.71	293334.29	4	4	0	0	2	-2.70	5.00		319772.39
Mountaintown Creek 03	0	1	7773.22	16297.74	0.00	0.00	4.48	262776.56	3	0	0	13	4	-2.37	6.00		286876.63
North Broad River 28	0	0	0.00	37113.25	0.00	2.12	22.53	52988.22	0	0	0	12	1	0.00	66.00	N	90205.12
North Broad River 32	0	0	0.00	13868.81	0.00	0.00	24.58	76250.19	0	0	0	3	4	-0.48	15.00	F	90165.10
North Broad River 33	0	0	0.00	5698.22	0.00	0.00	18.39	67090.46	0	0	0	1	0	-0.18	1.00		72808.90
North Broad River 38	0	0	0.00	38637.72	8052.81	0.00	90.65	62460.51	0	0	0	8	31	-1.50	15.00	F	109294.19
North Fork Broad River 01	0	0	14.10	337.40	0.00	0.00	1.89	163290.42	0	4	0	0	0	0.00	66.00		163713.81
North Fork Broad River 04	0	1	0.00	18339.38	0.00	0.00	19.33	126825.56	0	4	0	9	23	-0.01	15.00	F	145236.26
North Fork Broad River 05	0	2	0.00	10179.47	0.00	0.00	11.84	96332.98	0	0	0	2	1	-0.20	15.00	F	106544.09
North Fork Broad River 06	0	1	0.00	27985.87	0.00	0.00	36.36	113757.91	0	0	0	7	13	-0.35	14.00	F	141814.78
North Fork Broad River 11	0	0	0.00	24362.26	29.81	0.00	58.20	96133.49	0	0	0	6	8	-0.55	14.00	F	120611.21
Palmetto Creek 01	0	0	0.00	17516.18	0.00	0.00	17.10	1033112.39	0	2	0	6	4	-0.80	9.00	C	1050665.86
Palmetto Creek 10	0	7	0.00	32749.12	0.00	0.00	22.77	1033112.39	0	2	0	8	20	0.00	66.00	N	1065987.28
Pine Log Tributary 25	0	0	1630.48	3489.67	0.00	0.00	1.51	203589.84	0	2	0	0	0	-0.04	1.00		208714.47
Potato Creek 06	0	0	0.00	25989.65	0.00	0.00	36.11	45419.31	1	0	0	9	64	0.00	66.00	N	71585.07
Potato Creek 115	0	0	0.00	50959.25	20197.09	1.44	349.59	140191.27	1	0	0	6	20	-2.40	9.00	C	211732.24
Potato Creek 56	0	0	0.00	30194.41	12640.14	2.45	124.24	146887.74	0	1	0	8	34	-0.90	23.00	C	189914.08
Potato Creek 58	0	0	0.00	21943.96	0.00	0.00	75.97	136404.76	0	0	0	3	3	-0.50	14.00	C	158444.20
Potato Creek 66	0	0	0.00	2286.13	0.00	1.57	15.79	119175.48	0	1	0	1	0	-0.07	1.00		121481.90
Potato Creek 78	0	0	0.00	23658.67	0.00	4.36	97.01	145311.33	1	1	0	3	0	-0.80	9.00	C	169084.57
Potato Creek 82	0	0	0.00	39799.05	0.00	7.27	98.34	124626.77	0	0	0	8	23	0.00	66.00	N	164628.43
Pumpkinvine Creek 02	0	0	10892.97	18979.38	0.00	0.00	4.17	225286.54	1	2	1	0	0	-1.20	11.00	C	255176.86
Pumpkinvine Creek 08	0	0	7126.66	32251.80	0.00	0.00	12.39	452416.65	0	0	0	1	0	0.00	66.00	N	491874.51
Pumpkinvine Creek 11	0	1	0.00	8549.79	0.00	0.00	23.76	397701.65	3	0	0	4	11	-0.66	5.00		406298.53
Pumpkinvine Creek 16	0	1	0.00	21472.41	0.00	0.00	11.69	333657.18	1	1	0	3	21	0.00	66.00	N	355234.28
Pumpkinvine Creek 50	0	0	0.00	23193.36	0.00	3.13	7.49	408523.47	0	0	0	6	5	0.00	66.00	N	431804.45
Raccoon Creek 07	0	0	0.00	22133.22	0.00	0.00	5.77	194285.44	2	0	1	2	6	-1.00	24.00	C	216458.44
Raccoon Creek 08	0	0	11027.60	13047.19	0.00	0.00	2.56	211329.71	2	0	1	1	0	0.00	66.00	N	235477.06
Rock Comfort Creek 14	0	0	0.00	24105.01	0.00	0.00	75.60	1033112.39	0	0	0	3	0	0.00	66.00	N	1057362.00
Rooty Creek 05	0	0	0.00	11405.12	0.00	0.00	10.91	112522.02	1	0	0	14	28	0.00	66.00	N	124047.05
Rooty Creek 20	0	0	0.00	12392.33	0.00	0.00	10.30	137194.01	3	0	0	1	0	0.00	66.00	N	149666.64
Rooty Creek 21	0	2	0.00	19789.01	0.00	0.00	23.04	125669.44	1	0	0	11	23	0.00	66.00	N	145584.49
Rooty Creek 27	0	3	0.00	25917.14	0.00	0.00	18.43	109999.83	0	0	0	3	4	-0.40	24.00	F, C	135969.00
Sallacoa Creek 100	0	0	0.00	2850.04	0.00	0.00	1.55	154058.31	0	0	0	1	1	-0.03	1.00	C	156912.87
Sallacoa Creek 48	0	0	18186.68	23921.59	0.00	0.00	0.60	173712.99	0	0	0	3	8	-0.50	13.00	F, C	215845.36
Sallacoa Creek 62	0	0	0.00	6423.35	0.00	0.00	11.85	96565.55	1	0	0	0	0	-0.04	1.00	C	103002.71
Sallacoa Creek 74	0	0	8857.69	13443.73	0.00	0.00	1.92	205681.98	4	4	1	0	0	0.00	66.00	N	228060.32
Sandy Creek 08	0	1	0.00	37685.40	0.00	0.00	28.68	38777.49	0	0	0	18	119	0.00	66.00		76695.57
Sandy Creek 15	1	2	0.00	32755.35	0.00	1.34	45.24	68662.28	0	0	0	7	36	-0.80	14.00	F	101523.41
Sandy Creek 23	1	2	0.00	38493.11	7772.36	0.00	56.16	52971.03	0	0	0	5	24	-0.10	14.00	F	99338.55
Sautee Creek 10	0	0	3585.36	4771.86	0.00	0.00	11.42	516556.19	5	12	3	0	0	-0.47	1.00		524945.36
Sautee Creek 13	1	0	5456.76	6155.32	0.00	0.00	22.72	496557.06	6	1	0	8	8	-1.88	13.00	C	508226.97
Settingdown Creek 10	0	0	0.00	7616.14	0.00	0.00	5.61	125921.43	0	0	0	6	34	-0.63	28.00	C	133610.55
Settingdown Creek 11	0	0	0.00	9838.63	0.00	3.31	22.97	112562.63	0	1	0	3	5	-0.54	1.00		122437.00
Settingdown Creek 15	0	0	0.00	5007.12	0.00	0.00	11.84	112414.33	0	1	0	1	0	-0.14	1.00		117436.15
Settingdown Creek 16	0	0	0.00	13378.56	0.00	0.00	7.73	110460.73	0	3	0	12	93	-0.88	10.00	C	123964.15
Settingdown Creek 21	0	3	0.00	24754.02	0.00	1.67	60.00	119399.51	7	2	0	11	50	-2.10	40.00	C	144326.10
Sharp Mountain 01	0	0	10959.13	13494.55	0.00	0.00	12.19	185785.44	4	0	0	2	11	-1.60	9.00	C	210275.71
Sharp Mountain 02	0	0	7891.50	8676.35	0.00	0.00	3.40	183545.91	4	0	0	3	2	-0.80	9.00		200134.36
Sharp Mountain 12	0	0	24114.00	42149.80	0.00	0.00	22.64	186198.75	3	1	1	27	71	-2.30	13.00	F, C	252598.89
Sharp Mountain 22	0	0	16328.36	22135.15	0.00	0.00	24.82	171543.09	3	1	1	19	32	-1.00	13.00	F, C	210099.42
Soque 29	0	0	1676.39	5186.47	0.00	0.00	5.01	502171.59	0	0	0	1	0	-0.62	1.00		509040.84
Soque 34	0	0	1468.50	19210.80	0.00	0.00	6.73	507879.25	0	1	1	4	6	-2.72	7.00		528581.56
Soque 36	0	0	0.00	22393.53	0.00	0.00	6.19	509179.10	0	4	0	16	26	-2.35	33.00		531655.46
Soque 44	0	1	0.00	26061.49	0.00	0.00	21.83	504478.32	0	1	0	10	23	-1.20	7.00		530602.45
South Fork Broad River 06	1	3	0.00	44488.05	0.00	0.00	65.45	1033112.39	0	0	0	8	4	-1.30	14.00	F	1077694.60
South Fork Broad River 19	0	0	0.00	811.64	0.00	0.00	0.00	1033112.39	0	0	0	2	0	-0.50	13.00	F	1033938.53
South Fork Broad River 65	0	0	0.00	23025.23	0.00	0.00	32.27	1033112.39	0	0	0	5	1	-0.20	14.00	F	1056189.69
South Fork Little River 26	0	0	0.00	30734.40	0.00	0.00	27.85	1033112.39	0	0	0	2	0	-0.40	24.00	F, C	1063900.24
South Fork Little River 31	1	0	0.00	46755.14	0.00	0.00	72.26	1033112.39	0	0	0	2	1	0.00	66.00	N	1080009.79
South River 04	0	1	0.00	19304.11	0.00	0.00	18.22	1033112.39	0	0	0	6	17	-0.45	16.00	F	1052474.27
South River 27	1	2	0.00	89499.83	0.00	8.92	133.98	1033112.39	0	1	0	16	31	-6.80	10.00		1122809.32
South River 29	4	0	0.00	101984.90	0.00	5.62	339.32	1033112.39	0	1	0	22	54	-11.00	10.00		1135522.24
South River 31	1	0	0.00	41336.86	0.00	0.00	28.26	1033112.39	0	1	0	18	143	0.00	66.00		1074706.51
South River 46	3	5	0.00	26867.78	0.00	0.00	63.13	1033112.39	0	0	0	7	51	0.00	66.00		1060175.31
South River 51	0	0	0.00	22405.13	0.00	0.00	15.94	1033112.39	0	2	0	6	30	-0.10	14.00	F	1055585.35
Stamp-Shoal Creeks 01	0	0	0.00	39297.49	0.00	1.69	0.00	463167.53	4	0	0	0	0	-4.30	9.00	C	502475.41
Stamp-Shoal Creeks 02	2	0	0.00	40701.63	0.00	0.00	30.87	474990.44	5	0	0	8	48	-0.60	10.00	F, C	515795.35
Talking Rock Creek 01	0	0	13493.29	19126.09	0.00	0.00	13.47	242584.56	0	0	0	2	6	-0.85	4.00		275228.55
Talking Rock Creek 02	0	0	11293.93	12684.82	0.00	0.00	21.60	249617.00	1	0	0	4	3	-1.10	4.00		273628.25
Talking Rock Creek 13	1	0	0.00	22414.57	0.00	0.00	16.39	272111.99	1	0	0	7	1	-2.30	5.00		294555.65
Tobesofkee Creek 41	0	0	0.00	52631.95	0.00	1.16	158.65	1033112.39	0	0	0	5	10	0.00	66.00	N	1085985.15
Tobesofkee Creek 70	0	0	0.00	56777.92	0.00	7.22	134.47	1033112.39	0	0	0	5	3	-1.70	15.00	F, C	1090053.30
Upper Mulberry River 07	0	0	0.00	13375.74	0.00	8.61	11.75	85096.70	1	0	0	22	53	-0.50	12.00	F	98580.30
Upper Mulberry River 08	0	0	0.00	19142.50	0.00	0.00	8.06	67417.99	1	3	0	4	2	-0.80	16.00	F	86593.74
Upper Mulberry River 11	0	2	0.00	67879.89	15006.81	9.94	21.98	73892.42	0	3	0	74	2110	0.00	66.00		159066.04

C= Current drought controls; does not refill using current data
N= Never refills to normal pool over period of record (66 yrs)
F=Fraction of storage used. Safe Yield based on requirement to refill at least once in analysis period.

Sorting

Dam Name	Weighted Sum
Etowah River 12	25946.60
Euharlee Creek 49	34168.95
Grove River 33	36196.98
Etowah River 13	38688.01
Little Tallapoosa River 21	38978.50
Grove River 25	41270.28
Euharlee Creek 76	42743.92
Grove River 21	44201.64
Lower Little Tallapoosa River 74	46312.70
Euharlee Creek 51	47964.81
Little Tallapoosa River 06	54151.17
Barber Creek 06	68229.96
Lower Little Tallapoosa River 80	70443.80
Potato Creek 06	71585.07
Little Sandy-Trail Creek 06	71970.55
North Broad River 33	72808.90
Little Tallapoosa River 20	75159.87
Sandy Creek 08	76695.57
Hightower Creek 25	77370.69
Upper Mulberry River 08	86593.74
Mill Creek 08	87150.87
Ellijay River 10	88487.69
Little Tallapoosa River 16	89674.02
North Broad River 32	90165.10
North Broad River 28	90205.12
Ellijay River 03	91138.84
Cartecay River 10	93765.64
Ellijay River 01	95413.34
Upper Mulberry River 07	98580.30
Sandy Creek 23	99338.55
Sandy Creek 15	101523.41
Sallacoa Creek 62	103002.71
Ellijay River 11	104516.45
Lower Little Tallapoosa River 35	104860.17
North Fork Broad River 05	106544.09
North Broad River 38	109294.19
Ellijay River 12	109667.00
Little Tallapoosa River 19	111735.49
Ellijay River 09	117183.05
Settingdown Creek 15	117436.15
Grove River 59	117667.81
Beaverdam Creek 06	118883.42
North Fork Broad River 11	120611.21
Ellijay River 04	121278.61
Potato Creek 66	121481.90
Settingdown Creek 11	122437.00
Settingdown Creek 16	123964.15
Rooty Creek 05	124047.05
Beaverdam Creek 30	124728.48
Etowah River 26	129754.54
Beaverdam Creek 05	129978.38
Cartecay River 03	130556.84
Etowah River 01	130727.89
Cartecay River 01	131226.26
Beaverdam Creek 04	132786.02
Settingdown Creek 10	133610.55
Beaverdam Creek 17	133846.24
Rooty Creek 27	135969.00
North Fork Broad River 06	141814.78
Settingdown Creek 21	144326.10
North Fork Broad River 04	145236.26
Rooty Creek 21	145584.49
Cartecay River 05	145956.14
Rooty Creek 20	149666.64
Little Tallapoosa River 30	151129.69
Sallacoa Creek 100	156912.87
Potato Creek 58	158444.20
Upper Mulberry River 11	159066.04
Beaverdam Creek 08	161246.83
North Fork Broad River 01	163713.81
Potato Creek 82	164628.43
Etowah River 25	165387.31
Middle Oconee-Walnut Creek 18	167008.51
Potato Creek 78	169084.57
Long Swamp Creek 14	172169.27
Middle Oconee-Walnut Creek 06	173163.61
Cartecay River 06	178937.66
Cartecay River 08	180215.59
Etowah River 09	181650.50
Potato Creek 56	189914.08
Little River 07	191687.81
Cartecay River 07	195597.79
Mill Creek 07	195929.86
Sharp Mountain 02	200134.36
Etowah River 10	202695.03
Etowah River 32	206601.74
Pine Log Tributary 25	208714.47
Sharp Mountain 22	210099.42
Sharp Mountain 01	210275.71
Potato Creek 115	211732.24
Middle Oconee-Walnut Creek 12	215295.28
Sallacoa Creek 48	215845.36
Raccoon Creek 07	216458.44
Sallacoa Creek 74	228060.32
Raccoon Creek 08	235477.06
Amicalola Creek 04	249200.22
Sharp Mountain 12	252598.89
Middle Oconee-Walnut Creek 03	253512.51
Pumpkinvine Creek 02	255176.86
Amicalola Creek 02	264802.38
Middle Oconee-Walnut Creek 07	267880.66
Talking Rock Creek 02	273628.25
Talking Rock Creek 01	275228.55
Barber Creek 26	275489.40
Mountaintown Creek 03	286876.63
Amicalola Creek 03	291488.69
Talking Rock Creek 13	294555.65
Middle Oconee-Walnut Creek 01	316671.69
Mountaintown Creek 02	319772.39
Mountaintown Creek 01	325006.61
Pumpkinvine Creek 16	355234.28
Pumpkinvine Creek 11	406298.53
Pumpkinvine Creek 50	431804.45
Little River 17	448438.71
Little River 15	449144.13
Little River 31	449514.72
Little River 36	454860.00
Little River 19	456821.26
Mill-Canton Creeks 04	459557.35
Mill-Canton Creeks 07	460545.58
Marbury Creek 22	464827.91
Little River 21	470117.50
Little River 27	479913.64
Pumpkinvine Creek 08	491874.51
Little River 25	494450.88
Hazel Creek 12	496983.48
Stamp-Shoal Creeks 01	502475.41
Hazel Creek 19	504641.06
Hazel Creek 21	507820.36
Sautee Creek 13	508226.97
Soque 29	509040.84
Stamp-Shoal Creeks 02	515795.35
Sautee Creek 10	524945.36
Soque 34	528581.56
Soque 44	530602.45
Soque 36	531655.46
South Fork Broad River 19	1033938.53
Middle Fork Broad River 17	1042462.16
Middle Fork Broad River 06	1043527.51
Middle Fork Broad River 30	1044454.54
Middle Fork Broad River 44	1044836.24
Bishop Creek 07	1048478.61
Palmetto Creek 01	1050665.86
South River 04	1052474.27
South River 51	1055585.35
South Fork Broad River 65	1056189.69
Big Cedar Creek 32	1056812.84
Rock Comfort Creek 14	1057362.00
Lower Little Tallapoosa River 19	1059148.37
South River 46	1060175.31
Middle Fork Broad River 28	1060755.66
Lower Little Tallapoosa River 82	1061000.51
Lower Little Tallapoosa River 14	1061572.84
South Fork Little River 26	1063900.24
Palmetto Creek 10	1065987.28
Little Satilla Creek 07	1072866.42
Little Tallapoosa River 51	1073845.80
Lower Little Tallapoosa River 93	1074033.98
South River 31	1074706.51
Lower Little Tallapoosa River 25	1075547.91
South Fork Broad River 06	1077694.60
South Fork Little River 31	1080009.79
Tobesofkee Creek 41	1085985.15
Tobesofkee Creek 70	1090053.30
South River 27	1122809.32
South River 29	1135522.24

Results (Top 30)

#	Dam Name	Weighted Sum
1	Etowah River 12	25946.60
2	Euharlee Creek 49	34168.95
3	Grove River 33	36196.98
4	Etowah River 13	38688.01
5	Little Tallapoosa River 21	38978.50
6	Grove River 25	41270.28
7	Euharlee Creek 76	42743.92
8	Grove River 21	44201.64
9	Lower Little Tallapoosa River 74	46312.70
10	Euharlee Creek 51	47964.81
11	Little Tallapoosa River 06	54151.17
12	Barber Creek 06	68229.96
13	Lower Little Tallapoosa River 80	70443.80
14	Potato Creek 06	71585.07
15	Little Sandy-Trail Creek 06	71970.55
16	North Broad River 33	72808.90
17	Little Tallapoosa River 20	75159.87
18	Sandy Creek 08	76695.57
19	Hightower Creek 25	77370.69
20	Upper Mulberry River 08	86593.74
21	Mill Creek 08	87150.87
22	Ellijay River 10	88487.69
23	Little Tallapoosa River 16	89674.02
24	North Broad River 32	90165.10
25	North Broad River 28	90205.12
26	Ellijay River 03	91138.84
27	Cartecay River 10	93765.64
28	Ellijay River 01	95413.34
29	Upper Mulberry River 07	98580.30
30	Sandy Creek 23	99338.55